CORNELL EXTENSION BULLETIN 696

The Home VEGETABLE *Garden*

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The Home Vegetable Garden

Arthur J. Pratt, Ray R. Kriner, and Arden F. Sherf

Why Have a Garden?

No one is likely to eat better than the home gardener who has a well-planned and a well-cared-for garden. Not only can he have fresher vegetables than he can buy, but he can grow high-quality varieties that seldom get on commercial markets. Large families can save as much as several hundred dollars a year for food if they grow vegetables for canning, freezing, and storage as well as for fresh use. Furthermore, a garden provides wholesome recreation for the city or suburban family. It also gives a chance to teach young people a sense of responsibility in managing a small business, especially if the garden supplies more than the family needs so that there is some surplus for sale to provide them with a cash income.

Where to Have a Garden

If there is any choice in location, the garden should be near the house so that odd moments can be used to care for it and to gather vegetables without waste of time. It should be in an area that is or can be fenced conveniently if livestock, woodchucks, rabbits, or children are likely to run through it.

Soil

You can make a good garden wherever weeds will grow. Stony land and steep slopes may be productive but are difficult to work. Areas that are low and wet should not be used for a garden spot. A fine, sandy loam or silt loam is best, but heavier soils are satisfactory. Crops on sandy soils usually suffer quicker from dry weather than do those on the heavier soils. The heavy soils, however, are more difficult to handle and must not be worked when they are too wet (figure 12). You can lighten a clay soil with coal ashes (page 10). Heavy applications of organic matter (pages 7 and 8) improve all soils. Soil acidity is discussed on page 6. If you are in doubt about the suitability of your garden soil, you may obtain advice from experienced friends or neighbors or from a county agricultural agent, a local vocational teacher of agriculture, or a local science teacher.

Shade

Vegetables do best where they get at least 5 or 6 hours of full sunlight during the middle of the day. If there is a choice, put the root crops, tomatoes, corn, potatoes, cucumbers, and melons in as full sunlight as possible, as broccoli, snap beans, cabbage, and most of the leafy crops can withstand more shade. Tree roots take moisture and plant food from the crops.

Equipment

EVERY gardener needs a hoe, an iron rake, and a spading fork or spade or round-pointed shovel. Four or more stakes and a heavy cord twice as long as the garden are a help in making straight rows (figure 13). For large gardens, a good wheel hoe or hand cultivator multiplies a gardener's efficiency many times.

Small garden tractors save labor at planting and cultivation and for large gardens are economically justified. The young people of the family are likely to be much more interested in the garden if there is a tractor.

Gardening is easiest when you keep all tools clean and well sharpened. Sharpen all cutting edges and tighten all loose nuts, bolts, or screws to save wear. Most edged tools can be sharpened easily with a file, an emery wheel, or a grindstone. A hoe may be sharpened on either or both sides of the blade.

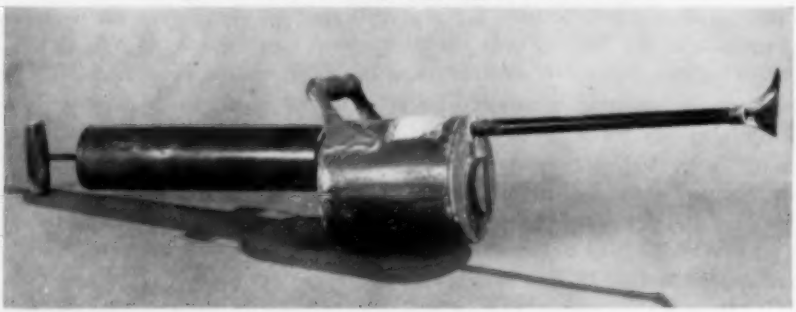
Tools last longer if you keep them free from rust. Clean rusted tools with a rust-remover paste or with steel wool. Keep all tools clean with an oily rag and put them under cover when not in use.

Sprinklers are a standard part of the garden equipment if water is available to irrigate the garden. One way to sprinkle is shown in figure 20 (page 25).

Dusters and sprayers

Most home gardeners should have a duster or sprayer to control pests satisfactorily. An all-metal plunger type of hand duster (figure 1) with the

Figure 1. An all-metal plunger type of hand duster



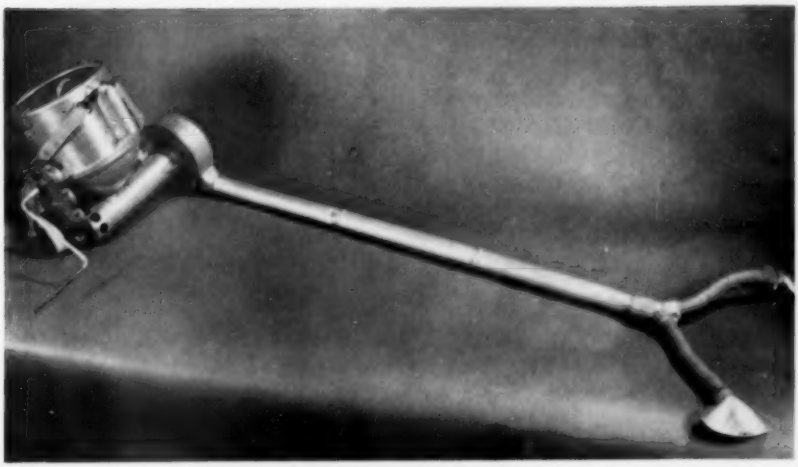


Figure 2. A strap-on duster with blower

outlet curved upward is especially good for treating the underside of the foliage. For large gardens, the bigger strap-on duster with blower (figure 2) is desirable. Be sure to remove the dust from the duster after each application, to prevent any collection of moisture in the duster and to prevent it from rusting.

A good sprayer is almost a must for the application of insecticides and

Figure 3. A back-pack sprayer

Figure 4. A compressed-air sprayer

fungicides in the home garden. The back-pack sprayer (figure 3) with the angled outlet and an adjustable nozzle is satisfactory for a large garden where it is necessary to mix from 3 to 4 gallons of spray at a time. The compressed air sprayer (figure 4) comes in several sizes and need not have a pressure gauge as shown. Rinse a sprayer with clean water immediately after spraying and hang it up to drain and dry. Apply oil to the parts so designated. These pieces of equipment last for many years with proper care.

Soil Testing and Problem Soils

Soil test kits for amateur gardeners are advertised in many magazines, but any county agricultural agent in New York State, or the New York State College of Agriculture, and many of the vocational agriculture or science teachers are prepared to make a simple soil acidity, or pH, test at no cost. There is a small fee for a complete chemical analysis of your soil at the New York State College of Agriculture. The sampling should be done according to instructions from the Soil Testing Laboratory or by your county agricultural agent.

In many problem gardens, soil testing does not show the reason for poor growth. Perhaps the trouble is simply a lack of adequate fertilizer (page 8). Unless you add enough commercial fertilizer or manure and superphosphate each year, no garden can be expected to produce well. Sometimes shade is the reason for poor growth. Vegetables need the full light of the sun for at least 5 or 6 hours a day. If the shade is caused by trees, the tree roots may be stealing the moisture and fertilizer from the garden crops. Poor drainage results in poor crop growth. Many garden soils are seriously affected by drought. If water is available, irrigation (page 24) will correct that situation. Where water for irrigation is not available, a mulch (page 24) will help to cut down the water loss from the soil.

Soils should be loose and porous for quick water and crop-root penetration and for good aeration. One way to keep your garden soil loose is not to walk on it any more than is necessary. Another is not to work it when the soil is too wet. An organic mulch helps to keep the soil loose.

The simple soil acidity, or pH, test is most important, but even that is not necessary if all crops are growing well. If some or all crops are not growing well, or if your garden space is where you never had one before, then a pH test may be necessary. The complete chemical test seldom means much to the home gardener. If your soil is high in phosphorus and potash, you may as well keep it that way by putting on a good application of a complete commercial fertilizer every year. If the test shows that these elements are low, the recommended amount of commercial fertilizer (page 8) applied each year takes care of the needs of a good crop. Minor elements,

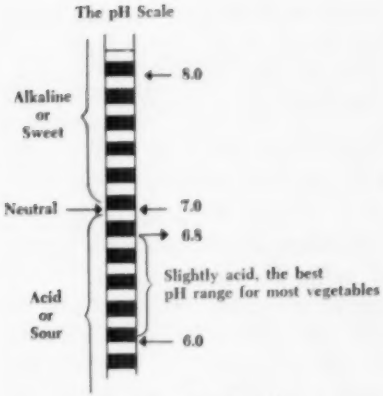


Figure 5. A pH scale

such as magnesium, manganese, and boron, are not likely to be a problem if you keep the pH within the proper range.

The symbol pH and the figures accompanying it are used to express the soil reaction. A soil with a pH of 7.0 is *neutral*, while one with a pH of 7.1 or above is *alkaline* or "*sweet*." Most vegetables grow best on a soil that is slightly acid, that is, where the pH is between 6.0 and 6.8.

No lime should be used on the garden unless you have had a test made and the soil is too acid. If the pH is between 5.5 and 6.0, use 3 pounds of ground limestone to each 100 square feet of garden on sandy soils or 5 pounds on heavy soils. That application may be made either before or after plowing or spading. If the pH is between 5.0 and 5.5, use the above amounts in an application before plowing plus another application of the same amount after plowing but before harrowing. If the pH is 4.9 or below, use double the recommendation for the 5.0 to 5.5 range.

When the pH is too high, you need to acidify the soil only if crop growth is poor. Most commercial fertilizers have some acidifying effect on the soil and gradually correct a high pH soil. One reason why a high pH is harmful is that it makes certain necessary minor elements, such as boron and manganese, unavailable to plants. Dusting sulfur, at the rate of 1 pound to 100 square feet, makes the soil more acid and that makes available again for plant use the boron and manganese that is already present in the soil. The sulfur should be put on after plowing or spading but before harrowing or raking so that it gets thoroughly mixed into the soil.

Organic and Inorganic Fertilizers

ORGANIC matter in the soil is most important. It makes sandy soils easier to work and increases their water-holding capacity. It makes heavy soils looser and easier to work, improves their ability to take up water rapidly during irrigation or a heavy rain. It improves their drainage, increases aeration, and tends to make them warm up earlier in the spring.

Much has been said and written comparing organic and inorganic fertilizers. Actually neither one alone is adequate. Only in commercial fertilizers is it possible to get the proper ratio of fertilizer nutrients, and only

commercial fertilizers supply the total nutrients needed at an economical cost. Only organic fertilizers, on the other hand, do the things credited to organic matter in the paragraph above. But organic matter does not control insects or diseases as is sometimes claimed, and commercial fertilizer does not make the crops poisonous to eat.

Commercial fertilizers

Commercial fertilizers are applied mainly because of the nitrogen, phosphorus, and potash they contain. A 6–12–6 fertilizer contains 6 per cent of nitrogen, 12 per cent of phosphoric acid, and 6 per cent of potash.

A 6–12–6 or a 5–10–5 fertilizer or one of a similar analysis should be used at the rate of 4 or 5 pounds to each 100 square feet of garden area. On sandy soils this commercial fertilizer is likely to give best results if you broadcast part of it after plowing or spading and add the rest during the growing season. On loams and clays, results are likely to be best if you broadcast one-half of the fertilizer just before spring plowing and the balance just after.

Part or all of the commercial fertilizer is sometimes sowed in bands near the row or around such plants as tomatoes. Not more than 2 or 3 pounds of fertilizer should be used in bands to each 100 feet of row, and the bands should be 3 or 4 inches away from the row and at least 2 inches deep. More than this quantity of fertilizer or in bands closer to the row may injure the young seedlings. Band fertilizer applications are slow and difficult to make by hand.

If a crop has been harvested and another is to be planted there the same year, make a second application of fertilizer equal to that used for the first crop.

Farm manure

The primary value of manure, green manure, and compost is to supply organic matter, though farm manure can be used also to supply the bulk of the fertilizer elements (nitrogen, phosphoric acid, and potash) if it is supplemented with 1 or 1½ pounds of superphosphate to each bushel of manure, which is enough for from 50 to 75 square feet of garden area. This is at the rate of approximately 1000 pounds of superphosphate and 20 tons of manure to the acre. Unless manure is well rotted, it is best put on before plowing or spading and then turned under. Poultry, sheep, and goat manure should be used at the rate of no more than 1 bushel to 100 square feet of garden.

Dried manure is usually a very high priced source of both organic matter and fertilizer nutrients. Its use may be justified on small plots and especially if other forms of organic matter are not readily available.

Compost

Compost is a good source of organic matter for the village, city, or suburban garden. A compost pile may be made of leaves, weeds, straw, waste hay, vegetable garbage, and any waste vegetable matter other than diseased parts of vegetables. Pile these materials together as they accumulate during the season. Keep the lighter materials, such as leaves, from blowing away by throwing a little soil over the pile. The next spring start a new pile and turn the old one over to mix the material and to insure more even decay. Turn the compost over two or three times during the second season. It will be ready to apply to the garden before fall or spring plowing. A leaf compost may, however, be used for a mulch the first spring after the pile is built (page 24), or it may be put directly on the garden and turned under the first year. The composting process uses up about one-half of the organic matter in the material composted.

Figure 6. A fire hazard, a disagreeable smudge, and a complete loss of valuable humus

Leaves or weeds should never be burned but should be saved for the compost pile, since the yield of a garden will depend to a considerable extent on the quantity of organic matter which is added to the soil

You may mix a cupful of a complete commercial fertilizer, such as 5–10–5, or a forkful of manure with each bushel of compost to hasten decay and to make it a more valuable material. It is not necessary to add special bacteria or special fertilizers to make the compost more satisfactory.

Peat moss

Peat moss is a good source of humus. One application of peat at the rate of 1 bale to 1000 square feet should be enough for three or four years, or applications of from one-third to one-fourth of this amount may be made every year. One of the best uses of peat moss in the vegetable garden is as a mulch the first year and then worked in the soil the next year.

Green manure and cover crops

The amount of organic matter in the soil can be increased slightly and erosion and leaching can be reduced by the use of an over-wintering cover or green-manure crop. Since vegetables occupy the garden for most of the growing season, there is but little time to grow a warm-season green-manure crop. Rye is the best crop to plant under these conditions.

When a garden crop has been harvested and it is too late to grow another, sow rye in that space. Also, at or slightly before the time of the first killing frost in the fall, broadcast rye between the rows of late vegetables. Rye is seeded at the rate of 2 or 3 pounds to 1000 square feet. Stir the seed into the soil with a rake, hand cultivator, or harrow.

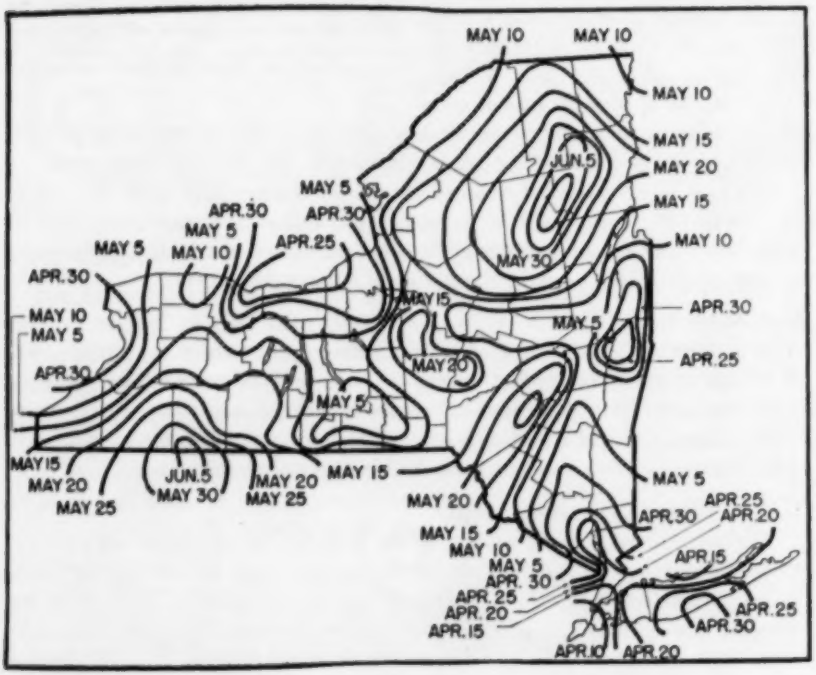
Ashes

Ashes from hard or anthracite coal are a partial substitute for organic matter but they contain little or nothing of value as a fertilizer. Sift ashes that contain clinkers or large pieces. They may be applied to a depth of 2 inches or more and thoroughly worked in to make a marked immediate improvement in the physical condition of the soil.

Wood ashes have the same effect on soil acidity as does lime, and should not be applied to the home garden in large quantities, unless the soil is definitely known to be acid. To correct an acid soil, use wood ashes at approximately double the rates suggested for lime (page 7).

Figure 7. Average dates of the last killing frosts in the spring

Local conditions, such as slope, elevation, exposure, and nearness to large lakes, may make a great difference between frost dates in places only a short distance away



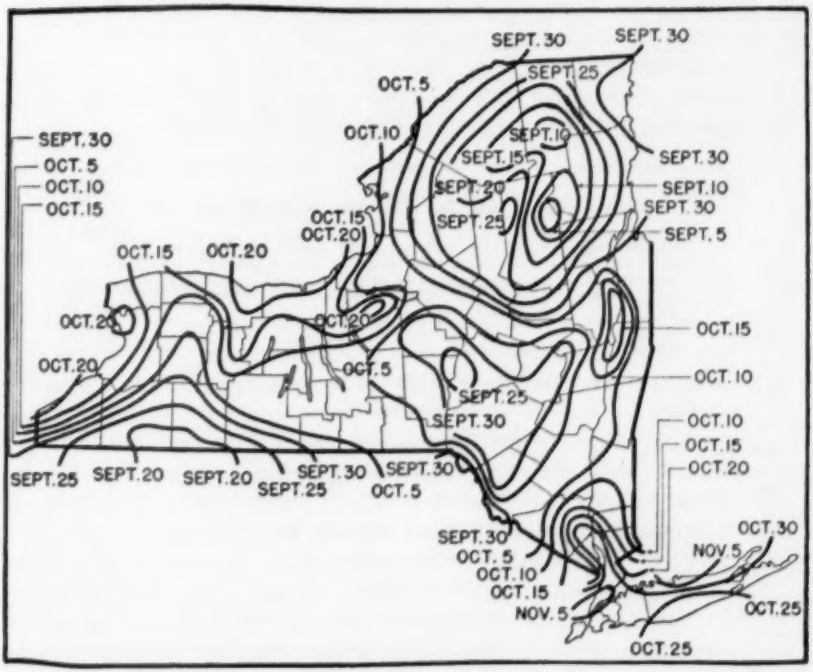
Planning the Garden

Choosing the crops

THE vegetables to grow are those liked by your family. This list may be limited by the size of the garden and by the crops that are likely to be successful in the area. For example, lima beans and melons seldom produce good crops in the high elevation and the short-growing-season areas of upstate New York. It is also well to consider the vitamin content of the vegetables to be grown.

The size of the garden not only limits the number of kinds of vegetables that you may grow but it should also influence the choice of these kinds. Lettuce, snap beans, cabbage, carrots, and tomatoes are the easiest to grow. Lima beans, cucumbers, and peas are more difficult and yield less for each unit of area occupied and are, therefore, usually grown only where space is relatively unlimited. Large-growing crops in a small garden limit the number of kinds that can be planted.

Figure 8. Average dates of the first killing frosts in the fall



Paper plans

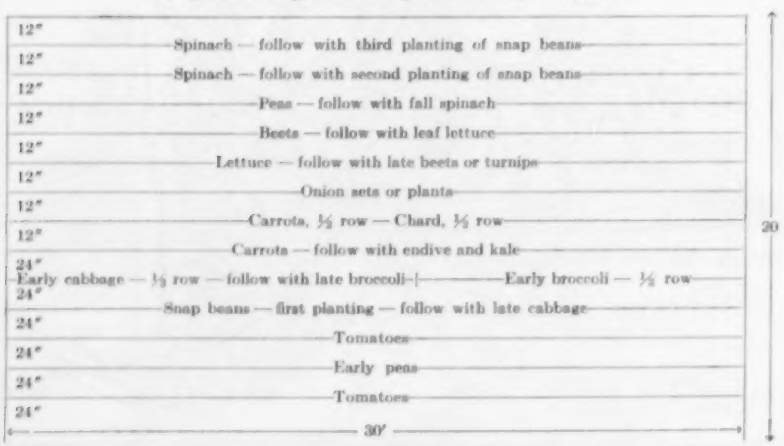
Even if you are an experienced gardener, a plan on paper is a real help. It saves time when you get ready to plant, helps to insure against omitting any crops, and also helps you to decide on the amount of each crop to plant (table 2, page 60).

The plan may be only a list of the crops to be grown, with the number of rows, the distance between rows, and the planting dates for each vegetable, or it may be a map of the garden drawn to scale to show all the details. A large sheet of light-colored wrapping paper is good for a large-garden plan. The scale used depends on the size of your garden and on the size of the sheet of paper, but need not be greater than 1 inch to 2 feet of garden and should not be less than 1 inch to 8 feet.

With information on how to do it, almost any gardener can make a better plan for his own garden than anyone else can make for him. The following requirements should be considered:

1. Group the crops according to size, to prevent shading.
2. The garden rows may be either east and west or north and south. If they are east and west, plant the tall-growing crops on the north side of the garden so they do not shade the small ones.
3. If the garden is on a hillside, run the rows across the slope and not up and down it. This helps to hold moisture and to reduce erosion.
4. Group together hardy, small-growing, quick-maturing crops.
5. Remove refuse of the early-maturing crops and replant that area with other crops that will mature by the end of the growing season.

Figure 9. A plan for a garden 20 by 30 feet


12″ Spinach — follow with third planting of snap beans
12″ Spinach — follow with second planting of snap beans
12″ Peas — follow with fall spinach
12″ Beets — follow with leaf lettuce
12″ Lettuce — follow with late beets or turnips
12″ Onion sets or plants
12″ Carrots, ½ row — Chard, ½ row
12″ Carrots — follow with endive and kale
24″ Early cabbage — ½ row — follow with late broccoli — Early broccoli — ½ row
24″ Snap beans — first planting — follow with late cabbage
24″ Tomatoes
24″ Early peas
24″ Tomatoes
24″
30′
20

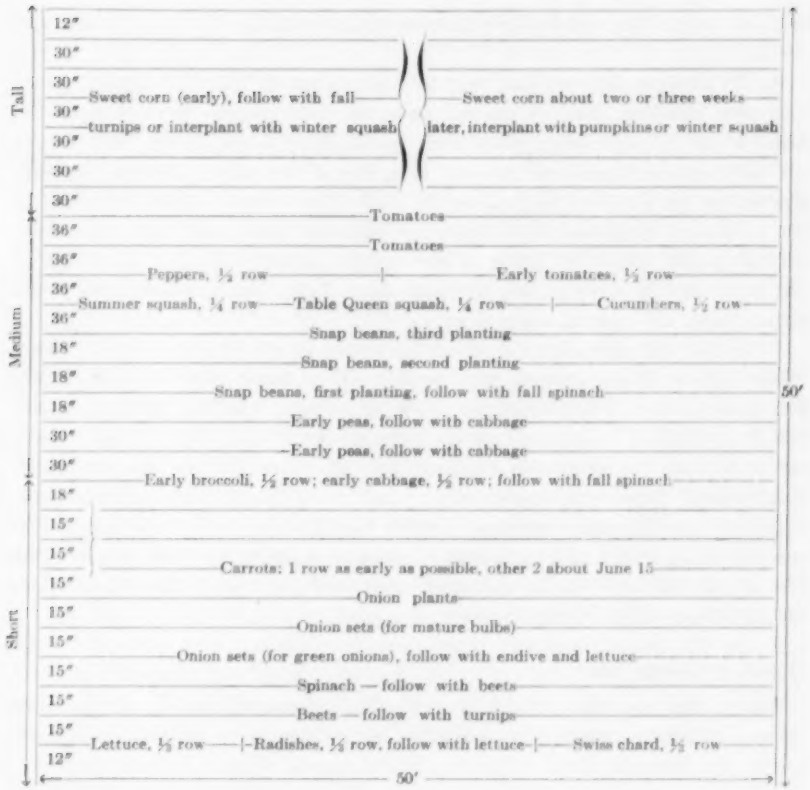


Figure 10. Planting plan for the medium-sized garden

Experience teaches the gardener how to make a plan that suits his needs

Make a second application of fertilizer at the time the first crop is removed (page 8).

6. Do not plant corn in long, single rows. At least three adjacent rows of each variety at each planting are needed to insure good pollination and hence a good set of kernels.

7. You may conserve space in the small garden by intercropping. Peas, spinach, or lettuce may be interplanted where tomatoes or corn are to be grown. Broccoli and cabbage plants may be set between the hills of early corn to get a start before the corn matures. The corn must be cut as soon as it is picked, to allow full sunlight to get to the other crop. Intercropping

is likely to be successful if the garden has a good supply of moisture and fertilizer.

8. To prevent diseases that may live over from the previous season, practice crop rotation. That is, do not grow the same vegetable in or near the same location more often than once every three years. Since members of the same plant family are subject to many of the same diseases, rotation should be by families as well as by individual crops. Move members of the cabbage-cauliflower-broccoli-brussel-sprouts family and the cucumber-melon-squash family to parts of the garden where no other members of the same family were grown the past year. Crop rotation and seed treatment (page 16) control many diseases.

9. In the autumn after crops are harvested or in the spring before vegetables appear in the garden, treat with 2,4-D or some other weed eradicant all waste places, fence rows, or other areas near gardens, and especially about hotbeds or coldframes, or keep the spaces mowed with a lawn mower to protect all the vegetable seedlings against virus diseases that are transmitted from the weeds by insects.

Of course, the plans shown in figures 9 and 10 for gardens 20 by 30 feet and 50 by 50 feet, can be adapted to smaller or larger gardens by changing the length of the row, by changing slightly the spacing between rows; or by adding or dropping some rows.

Space between rows

Space the rows far enough apart to be cultivated easily and yet close enough so that when the crops reach their maximum growth their tops will cover the ground. That helps to control weeds. Where a farm tractor is available, it may be desirable to space all rows alike for easy cultivation. Desirable row spacings for hand or garden tractor cultivation are shown in table 1.

Getting Seeds and Plants

Where to buy seeds

As with all merchandise, the quality of seed varies with the dealer. The New York State seed laws, however, protect the gardener fairly well against poor seed and misrepresentation. Make sure that the kind, the variety, the percentage of germination, and the date of testing are marked on every package. The best seedsmen usually offer seeds of good quality and label them as being treated. This is a simple way to use seed treatment.

Usually *certified* seed is truer to the variety type and is less likely to carry diseases than is non-certified seed. Seed from disease-free sources, such as

Table 1. Distance Between Rows

From 12 to 18 inches	*From 18 to 24 inches*	*From 30 to 36 inches*	*36 inches or more*
Beets	Beans (snap)	Beans (lima)	Asparagus, 3 to 5 feet
Carrots	Celery	Broccoli	Cucumbers, 4 to 6 feet
Chinese cabbage	Chard	Brussels sprouts	Melons, 4 to 6 feet
Endive	Kale	Cabbage	Rhubarb, 3 to 5 feet
Kohlrabi	Peas	Cauliflower	Summer squash, 4 to 6 feet
Lettuce	Peppers	Corn	Tomatoes (not staked), 3 to 5 feet
Onions	Rutabagas	Eggplant	Winter squash, 5 to 8 feet
Parsley	Soybeans	Peas (tall varieties)	
Parsnips		Potatoes	
Radishes		Tomatoes (if staked)	
Salsify			
Spinach			
Turnips			

western-grown pea seed, Puget-Sound-grown cabbage seed, Idaho- and California-grown snap beans, and northern-grown tomato seed, is always to be preferred. If you buy tomato, pepper, or cabbage transplants, be choosy and insist on getting green sturdy plants of known varieties.

The simplest and most satisfactory way to combat certain vegetable diseases is to grow resistant varieties when such are available and are adapted to local growing conditions. The starred (*) varieties in table 2 (page 60) are resistant to certain common diseases. Complete information on disease control is given under the culture of each individual crop (pages 33 to 64).

Plants

Some persons start plants in a hotbed or a window box to get earlier production and to increase the length of the growing season. You can grow your own plants but it may be simpler to buy them. If you buy plants, it is best to get them from a plant grower who treats the seeds and sterilizes the plant-growing soil.

Plants started in the average house window are likely to be tall and spindling because of low light intensity and high temperature.

How much seed to buy

A general guide as to quantities of seed to buy is given in table 2 (page 60). Buy enough seed at one time to take care of all the plantings for the season, but buy no more seed than you will need for one year. Keep in a dry place any seed to be held over for the next season. Check the germination before planting.

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The simplest and most satisfactory way to combat certain vegetable diseases is to grow resistant varieties when such are available and are adapted to local growing conditions. The starred (*) varieties in table 2 (page 60) are resistant to certain common diseases. Complete information on disease control is given under the culture of each individual crop (pages 33 to 64).

Plants

Some persons start plants in a hotbed or a window box to get earlier production and to increase the length of the growing season. You can grow your own plants but it may be simpler to buy them. If you buy plants, it is best to get them from a plant grower who treats the seeds and sterilizes the plant-growing soil.

Plants started in the average house window are likely to be tall and spindling because of low light intensity and high temperature.

How much seed to buy

A general guide as to quantities of seed to buy is given in table 2 (page 60). Buy enough seed at one time to take care of all the plantings for the season, but buy no more seed than you will need for one year. Keep in a dry place any seed to be held over for the next season. Check the germination before planting.

Saving seeds from the garden

It is best to buy seeds from a seedsman, but a few kinds, such as eggplant, peppers, radishes, and tomatoes, can be easily saved from the garden if you wish to do so as a hobby. To the home gardener, the serious obstacles in saving seed are the danger of crossing and of getting seed-borne diseases and the difficulty of curing and storing the seed. Any seed held over from a previous year or any home-saved seed should be tested for germination in advance of the planting season.

Seed treatment

Seed treatment kills disease organisms in or on the seed and prevents seed rot and "damping-off," or rotting, of the young seedlings. Many serious diseases of tomatoes, peppers, cabbage, cucumbers, and melons are commonly carried in or on the seed and can be controlled by planting seed that has been treated with hot water or corrosive sublimate. This treated seed can now be purchased from reputable seed companies.

If you choose to use the corrosive sublimate treatment yourself for seed of cucumber, squash, or melons, you merely soak these seeds for 5 minutes in a 1–1000 solution of corrosive sublimate (one 8-grain tablet in 1 pint of water), rinse very thoroughly, and let the seed dry. For pepper, use 1 tablet in 3 pints of water.

Caution: Corrosive sublimate is a deadly poison. It must not be used in cooking utensils or dishes; any excess solution must be discarded immediately and the container washed; excess tablets should be kept in a clearly marked poison bottle on a high shelf or under lock and key.

Tomato, cabbage, and eggplant seeds are best treated with hot water at 122°F. for 25 minutes (cauliflower and broccoli for 20 minutes) followed by immediate drying. Then previous to planting, dust these seeds with one of the materials discussed in the following paragraphs.

Treatment to prevent seed rot and damping-off

Most vegetable seeds need protection against seed rot and damping-off in order to give better stands of sturdier plants. Even tomatoes, melons, and others already treated with hot water or corrosive sublimate still need additional chemical protection.

By adding a small amount of arasan or captan to the seed packet (figure 11) this can be easily done. For packets of seed, the tip of a pen knife carries enough chemical. Then shake the packet for a few seconds and the treatment will be completed. For larger quantities of seed, use ½ teaspoonful of the chemical per pound of seed or use as the manufacturer directs. Small

Figure 11. Treating seed in the packet

foil packages of these seed treatment chemicals are on the market and can be kept from year to year.

Don't fail to use this cheap, easy disease control step.

Maggot control

It is common to find small white maggots destroying the bean, radish, or turnip seedling at root level. These maggots are the larvae of either the seed-corn maggot fly or the cabbage maggot fly. Recently set cabbage, broccoli, or cauliflower plants may have maggots feeding at the roots. To protect the seed you plant from maggots, use a seed treater containing an insecticide as well as a fungicide. Also, you may dust one of the insecticides in the furrow before you cover the seeds. For setting out the plants, you may use a transplanter solution containing an insecticide in the transplant water.

Getting the Soil Ready to Plant

Plowing or spading

THERE are arguments for and against both spring and fall plowing. Fall plowing of most New York gardens is not recommended, however, because no cover crop can be grown and because most gardens contain late vegetables that should be left in the ground until about Thanksgiving.

Figure 12. Correct (left) and incorrect (right) soil moisture

The soil on the left is dry enough to work, while that on the right is too wet

Turn the ground over in the spring (if it has not been done in the fall) just as soon as it is dry enough to work. A good test is to mold a handful of the soil into a ball with the hands. If the ball is not sticky but crumbles readily when pressed with the thumb, the soil is ready to be worked (figure 12). Suggestions on applying part of the fertilizer before plowing are given on page 8.

Plow or spade the soil 7 or 8 inches deep or about as deep as it has been worked in the past, but not deep enough to turn up much light-colored soil. The exact way to spade the garden makes little difference.

Fitting the soil

Harrow or rake spring-plowed or spaded soil soon after turning to maintain good soil texture and to prevent excessive drying. It is not necessary to rake thoroughly the entire garden at one time. For the small-seeded crops, such as carrots, a finely pulverized surface insures easier planting, better germination, and a more even stand. A plank drag or a meeker harrow is useful in farm gardens to fit the soil for small seeds. These tools are much faster than a rake. The success of a farm garden often depends on getting the job done promptly and efficiently so as not to interfere unnecessarily with other farm work. The thoroughness with which the soil is prepared before planting determines to a large extent the ease, efficiency, and amount of later cultivation needed.

Planting the Garden

PLANT the garden during a period of three or four months, depending on the length of the growing season. It is not a job that can be done completely and satisfactorily in one day in the middle of the growing season. Such crops as spinach, peas, and onions will do best if planted as soon in the spring as the ground can be worked. Tomatoes and other tender plants should not be set in the garden until all danger of frost is past. Late cabbage, late cauliflower, and late broccoli plants, and Chinese cabbage seeds should not be put in the garden until late June or early July.

Drills or hills

A *drill* is a row of single plants spaced more or less evenly. A *hill* is a cluster of plants and not a mound of soil. Mounds are not recommended, for the soil in them dries out much quicker than if kept level. Most crops are planted in drills, although such widely spaced crops as squashes and melons may be easier to cultivate and to care for if planted in hills. Corn is another crop that may be planted in hills.

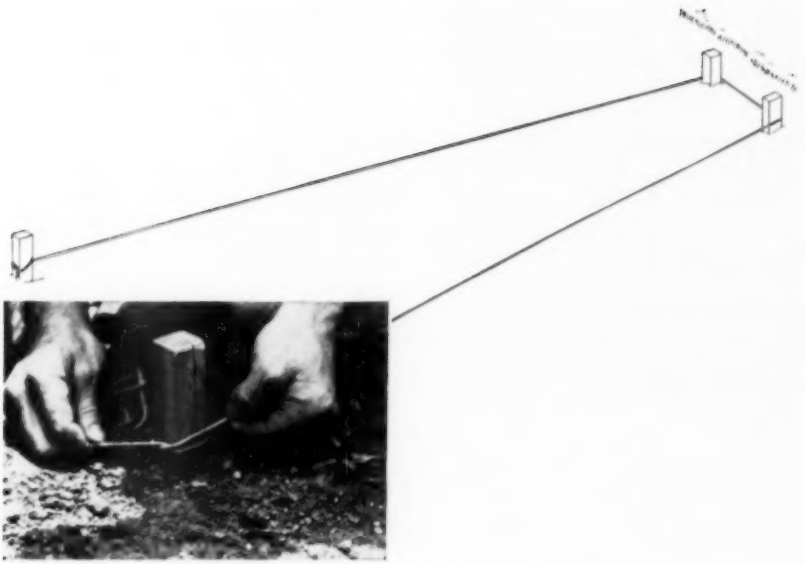


Figure 13. A knot is unnecessary when fastening a string around a stake

Just put the string 1½ times around and cross the tight line over the loose end on the back of the stake

Marking rows

A heavy cord stretched tightly between stakes at the opposite ends of a row makes it easy to mark a straight row. If it is used as indicated in figure 13, all planting and marking can be done in round trips with little waste motion.

To open the rows for large seeds, such as sweet corn, peas, and beans, walk backward, stepping on the string to hold it in place, and drag the blade of the hoe along the string, keeping one corner of the blade tilted down. The plow attachment for a wheel hoe also may be used to open furrows for large seeds and for plants. To open the rows for small seeds, drag the hoe handle along the string in short strokes, as in sweeping.

Sowing and covering the seed

Seeds should be sown a little thicker than the plants will finally stand, to allow for those that fail to grow and for plants that may be killed when they are very young. Plant 4 seeds of corn, beans, or other large-seeded vegetables for every 3 plants that are wanted. With the small-seeded crops,

such as carrots and lettuce, plant 3 or 4 seeds for each plant that is wanted (table 3, page 62). Space the seed uniformly. Too thick seeding wastes seed and wastes time to thin the plants. Cover large seeds, such as corn, peas, and beans with from 1 to 2 inches of soil; all small seeds, such as carrots, lettuce, and the like, are covered only from ½ to ¾ inch. With heavy soils or under other conditions where it may be difficult to get a good stand, covering the seed with only from ⅛ to ¼ inch of sand or well-rotted compost may improve the stand. Another possibility is to shade the row until the young plants start to push through the soil. This may be done with boards or papers held in place with stones or soil. Remove the shade in the evening so that the plant is gradually accustomed to exposure. During dry weather it may be necessary to sprinkle new plantings each day until they are well established.

Thinning

Remove surplus plants while they are small and before they compete with those that are to remain. The total yield is likely to be much greater if thinning is done early than if it is done only by removing those that are large enough to eat.

Transplanting to the garden

Since neither root nor top pruning is beneficial, transplant the plants with great care. Plants set in regular rows in flats are blocked-out as shown in figure 14. This may be done just before transplanting, to give the roots a chance to branch and to hold the block of soil together. Give the flats a thorough soaking an hour or more before transplanting. Also, keep the roots moist at all times when they are out of the soil.

Figure 14. A blocked-out tomato plant

To remove the blocked-out plants, hold the flat at a 45° angle and hit against the ground hard enough to slide the soil down ½ inch away from the upper end of the flat, then tip the flat nearly straight on end so that the first plants can be removed easily

How to set the plants properly is shown in figure 17. Pour some water (1 cup) or transplanting solution into the hole around each plant before the soil is replaced. A transplanting solution made by mixing 1 cupful of 5–10–5 or similar fertilizer to a 12-quart pail of water often gives greater livability and quicker recovery than does plain water. Then pack the soil tightly around the plant.

Figure 15. How to remove plants from clay pots

Water plants thoroughly a half hour or more before transplanting them. They may be removed easily from clay pots by putting one hand over the top of the pot, turning the pot upside down, and jarring the soil loose by gently hitting the edge of the pot against any solid object, as shown on the left. The soil should come out in one block with the roots practically undisturbed (right)

Figure 16. Cabbage plants in poor, good, and excellent condition for transplanting

The plant at the left was pulled out of dry soil, the one in the center was removed more carefully, and the one at the right was blocked out a week before transplanting and the soil was thoroughly soaked before the plants were removed from the flats

When there is club-root inoculum in the soil, it may be well to protect the young plants of the cabbage family by pouring a half pint of calomel suspension (1 ounce in 6 gallons of water) in each hole when setting the plants. Fertilizer as suggested may also be used. Shade the plants for a day or two with inverted baskets, pieces of board, or paper tents, to protect them from the sunlight; or set them out in the evening so they will get partly established before being exposed to sunlight.

Figure 17. Transplanted plant set slightly deeper than it grew in the flat or the seedbed

One cup of water or transplanting solution is poured around the plant before the hole is filled

Hotcaps

Plant protectors (*hotcaps*) usually are made of wax paper, are tent-shaped, and serve as miniature cold-frames. They are used, before the danger of spring is over, to start tender plants in the garden from seed, and to protect transplanted plants such as very early tomatoes. Place the caps over the seeded hills or transplanted plants as soon as seeding or transplanting is done. Cover the flanges at the bottom of the cap with soil to hold them in place. As soon as the danger of frost has passed, open the cap gradually to harden the plant. First make a small hole in the top or raise one side of the cap and enlarge that opening until the entire cap can be removed approximately a week later.

Cultivation and Weed Control

CULTIVATION generally increases the yield of vegetable crops because of weed control. On some soils, cultivation may be needed also to loosen the soil and allow rain water to enter more rapidly.

Weeds can be the gardener's worst enemy. They not only steal the moisture and fertilizer but also serve as cover for insects and diseases. Many weeds are affected by virus and fungus diseases that are carried to the crops. Furthermore, by shading the plants and interfering with air circulation, tall weeds may retard the evaporation of dew and rain from the foliage, thus favoring infection by bacteria and fungi.

A single cultivation will kill practically all weeds less than 1 inch tall, but it is difficult to kill them when they are 4 or 5 inches tall. It is not necessary to cultivate when there are no weeds, but during good growing weather

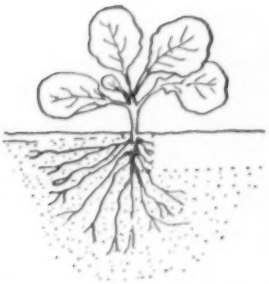


Figure 18. The right way (*left*) and the wrong way (*right*) to cultivate

It is the easiest for the gardener and best for the vegetables to cultivate very shallow. Cultivation only a fraction of an inch deep kills the weeds if done with the proper tools and at the proper time. See figure 19

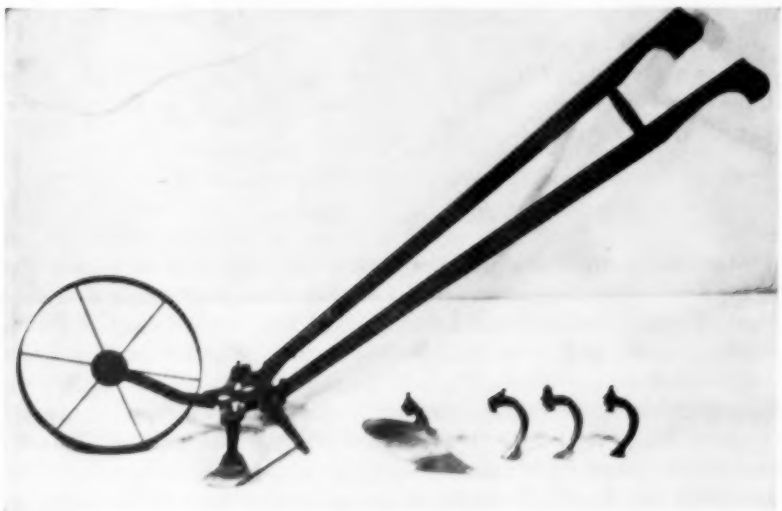
weeds grow enough to make weekly cultivation necessary.

Shallow cultivation is best, for it is less injurious to crop roots than is deep cultivation (figure 18) and is just as efficient in controlling weeds. A wheel hoe with weed knives, such as shown in figure 19, is one of the most efficient and useful tools for the home garden. A hoe is the next best hand tool for weed control.

Petroleum dry-cleaning compounds and paint thinners may be used as pre-emergence sprays to kill weeds before the crops come up or to spray directly carrots, parsnips, or parsley when these crops are 2 or 3 inches high. With these crops, the spray acts as a selective weed killer, taking out all weeds except ragweed, and causes little or no injury to the crop (page 40).

Figure 19. A good hand cultivator

This cultivator is especially efficient in controlling weeds if equipped with weed knives as shown. The teeth (right) help to loosen the soil for late planting. The plow (center) has little use except to mark rows



Mulches

WEED growth can be prevented by the use of mulches. Mulches also tend to conserve soil moisture, prevent erosion, do away with any root damage by deep cultivation or hoeing, and keep clean the fruits of such crops as tomatoes, cucumbers, and melons. Straw, old hay or grass, leaves, paper including old newspaper, sawdust, and wood planings are the most common materials for this purpose. Mulches are best applied after the soil has become warm and as soon as the crop plants are large enough so the plants will not be buried by the material.

Experiments have shown that black mulching paper may also increase soil temperature. The warmer soil is beneficial to melons and to some other crops, especially in the cooler seasons or regions. Most other mulching materials keep the soil cooler.

Some of the mulch papers, if carefully used, may be good for more than one year. Usually, part of the straw, hay, or wood by-products can be saved for another year with less work than getting an entire new supply. Any reasonable quantity left on the garden will, however, be beneficial to the soil when turned under. A large quantity of sawdust or other wood-product mulch plowed under or worked into the soil may cause the crops to become yellow due to a temporary shortage of nitrogen. This can be prevented by adding approximately 1 pound of nitrate of soda, or ½ pound of ammonium nitrate, or ¾ pound of cyanamid, or ¾ pound of ammonium sulfate, to each bushel of sawdust. On a good soil that is adequately fertilized each year you need to add no extra nitrogen until and unless you turn the mulch under. If the mulch is nearly gone at plowing time, little or no extra fertilizer is needed.

Leaves make an excellent and an economical mulch if gathered in the fall into flat-topped piles so that they become thoroughly soaked with rain and melted snow during winter and spring.

Watering the Garden

A SHORT PERIOD of dry weather may reduce the yield and lower the quality of the vegetables, and a long drought may result in a total failure of many gardens. Added water would improve the yield and quality of vegetables in most gardens at any time during the growing season when there has been no soaking rain (approximately 1 inch) for a week. Whether it will be profitable to water the garden depends on how easy it is to get water to the garden. If you have to carry water far in a pail, it will never pay to water more than a few tender crops or recently transplanted vegetables; but if water is available under pressure from a hose, you may

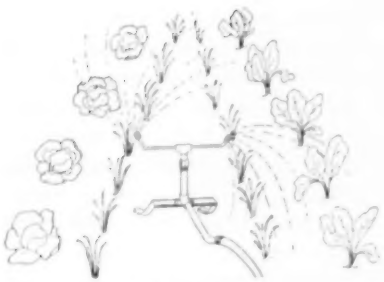


Figure 20

well water the entire garden once every 4 to 7 days if little rain falls during that period. Except for seeds that are difficult to start in dry weather, such as carrots and lettuce, water only once every 4 to 7 days and then heavy enough to soak the ground to a depth of 5 to 6 inches. This takes approximately ⅔ of a gallon of water to each square foot of garden, or from 75 to 100 gallons for an area no larger than the average-size room. One should know how much water is being applied. This can be done by placing two or three straight-sided cans in the area being watered.

On those crops where leaf blights may be a problem, such as potatoes and tomatoes, sprinkle irrigation should be done in the middle of the day. For only a few plants of such crops, it is possible to pour the water around the plants. This practice, however, tends to puddle and pack the soil, except with very sandy soils.

Disease and Insect Control

HOME gardeners may be disappointed in their attempts to control diseases if they rely only on spraying or dusting *after* diseases make their appearance. From seeding time until harvest, diseases may cause losses to vegetables. Successful disease control involves several practices, such as (1) the use of varieties resistant to certain diseases, (2) the use of seed or transplants as disease free as possible (certified), (3) seed treatment, (4) rotating the garden spot or changing crop location within the garden, (5) applying fungicides (page 27) regularly on tomatoes, potatoes, cucumbers, and melons, (6) controlling sucking insects that spread virus diseases, and (7) raking and burning garden refuse in the fall.

The disease-control recommendations for individual crops (pages 33 to 64) are designed for practical economical control of diseases of New York vegetables. In general, they are similar to measures being used by large commercial growers. Additional information, more detailed in nature, is given in Cornell Extension Bulletin 206, *The Control of Diseases and Insects Affecting Vegetable Crops;* Bulletin 878, *Muskmelons and Watermelons;* Bulletin 909, *Asparagus;* and Bulletin 917, *Cucumbers.*

The control of insects in the home garden should be planned in advance. There are many ways to discourage a build-up of insect pests. One of the

first lines of attack is to clean up and keep the garden free of plant refuse which may harbor developing or overwintering beetles, eggs, and worms. Leaving the growing plants in the garden unattended after harvest encourages further multiplication of pests. It is much better to pull and bury or burn plants after the crop has been taken.

Control of weeds in and around the garden is an important part of the clean up program. Some insects can subsist and multiply on weeds alone. Also, it is possible for insects to pick up diseases from weeds and carry them to the vegetable plants in our garden.

For many insect pests, insecticides (page 27) are the main line of defense. Frequent applications of DDT to newly set tomato or cabbage plants are necessary to prevent little black flea beetles from eating holes in the leaves. Aphids can enter heads of cabbage, lettuce, and broccoli unless regular applications of chemicals are used. Maggots feed on the roots of cabbage, radish, and turnips unless a chemical barrier is placed in the root or seed zone. In all of these situations a preventative treatment is recommended.

Some insects can be controlled by applying an insecticide after their first appearance is noted. The Mexican bean beetle is a good example of this. The hornworm on tomatoes can be controlled very well if you make regular observations of the plants to note the first injury. Frequently insects do a lot of damage before they are discovered. The old adage, an ounce of prevention is worth a pound of cure, holds true in the control of insect pests.

Attention should be given to the protection of many insect friends. The ladybird beetles feed on aphids and other insects. The bees help to pollinate the crops. The aphid lion and syrphid fly larvae are examples of those insects that you do not want to kill. Therefore, guard against the careless use of chemicals on all crops at any time.

To prevent harmful residues of chemicals on crops to be used for food, follow the recommendations precisely. It is most important to use only the chemicals that are recommended or labeled for a particular insect and crop. Always wash vegetables thoroughly before preparing them for the table.

Chemicals

Once the seed is planted or transplants have been set in the garden, disease or insect control depends upon spraying or dusting with chemicals to prevent infection or infestation. To be effective, the *right* chemical must be used in the *right* amount at the *right* time and in the *right* manner.

Chemicals used to control insects are called *insecticides*, those used to control fungus diseases are known as *fungicides*. In this bulletin specific chemicals are suggested for each disease or insect. Ready-mixed combinations of chemicals are, however, now being sold as "all-purpose" garden sprays or dusts. These are offered under various trade names and offer the advantage

of being effective against most diseases and insects commonly found in gardens. Although their cost is usually slightly greater than single chemicals if only small amounts of from 1 to 3 pounds are required, this difference in price is very nominal. *Read the label.* Be sure such mixtures contain at least one fungicide (captan, zineb, ziram, or fixed copper) and one or more insecticides (methoxychlor, rotenone, or malathion).

Fungicides

For the average garden, only two fungicides are needed (1) a fixed-copper spray or dust and (2) an organic, such as captan, zineb or ziram. These may be constituents of "all-purpose" mixtures. Bordeaux mixture is inferior to any of the above chemicals and is not recommended for garden use. The following fungicides are suggested:

Fixed-copper—may be formulated as a dust or as a wettable powder for making a spray suspension. Follow the label directions. Such materials are useful on tomatoes, potatoes, and beans.

Captan (Orthocide)—a yellow powder which may be used as a spray or dust. It has wide usefulness on potatoes, tomatoes, melons, and cucumbers.

Ziram (Zerlate, Z.C., Opalate, or Methasan)—a white powder especially effective on cucumbers and melons, potatoes, and tomatoes. Not effective against late blight of potatoes and tomatoes.

Zineb (Z-78, Parzate, Fungicide A)—a yellow powder effective for all fungus diseases of vegetables. This is a common constituent of "all-purpose" mixtures.

Maneb (Manzate, M-22)—a new organic wettable powder especially developed for use on tomatoes. Controls all leaf and fruit diseases of tomatoes due to fungi. Also suitable for mid- and late-season applications to cucumbers, melons, and squash.

Insecticides

DDT is a poisonous chemical and should be handled with care. It is good for many of the chewing insects, such as beetles and worms. DDT stunts the growth of cucurbits (cucumbers, melons, and squash). Sometimes young tomato plants are injured. This insecticide is usually purchased as a 3 or 5 per cent dust, a 25 or 50 per cent wettable powder, or a 25 per cent emulsifiable liquid. Do not use DDT on edible parts closer than 14 days to harvest.

Malathion is one of the phosphate insecticides and is generally considered to be as safe as DDT and Methoxychlor to apply. This chemical is not so long lasting as DDT or methoxychlor but kills sucking insects, such as aphids, as well as worms and beetles. This is more of an all-purpose in-

secticide. Malathion is available as a 4 or 5 per cent dust, a 25 per cent wettable powder, or a 50 per cent emulsifiable liquid. Do not apply malathion to vegetables closer than ten days to harvest.

Methoxychlor is an insecticide similar to DDT but can be used safely on cucurbits (cucumbers, melons, and squash). It kills leaf-chewing insects, such as worms, beetles, and thrips. This insecticide is also poisonous and attention should be given to the precautions on the label. Methoxychlor is available as a 5 to 7 per cent dust, or a 50 per cent wettable powder. Do not apply closer than 14 days to harvest.

Nicotine is a very poisonous chemical and is available as a liquid containing nicotine sulfate or as a dust. This material is effective mainly on aphids when mixed at the rate of 1 tablespoonful to each 1 gallon of soapy water. To obtain the maximum fumigant action of the nicotine, applications are best made on hot days. Nicotine does not last long on plants and therefore is safe to apply to edible parts of the vegetable up to several days before harvest.

Pyrethrum is safe to use on vegetables at most any time. Its chief use in the home garden is to control worms, such as those on cabbage, the squash bug, and possibly aphids. The effectiveness of pyrethrum is of short duration and therefore has little residual action. A rotenone-pyrethrum dust combination has proved satisfactory. Pyrethrum is available as a liquid concentrate for spraying and as a dust. Use a 0.3 per cent dust.

Rotenone, like pyrethrum, is extremely safe to use. This old stand-by is also good to control insects, such as the Mexican bean beetle, the squash borer, asparagus beetles, and cucumber beetles. Rotenone is practically non-poisonous to man and is safe to use on any vegetable at most any time. Use a 1 per cent dust.

All-purpose mixes. Many home-garden mixes contain several insecticides. Some mixtures are quite satisfactory; however, their effectiveness may be reduced if stored for long periods of time even in a sealed container. One suggestion is to mix your own at the time of making the application. Methoxychlor and malathion can be used together satisfactorily for the control of both chewing and sucking insects. Where you apply them together, use at the following rates: 3 tablespoonfuls of methoxychlor wettable powder plus 2 tablespoonfuls of malathion wettable powder to each one gallon of water. Do not attempt to mix the dusts together for dusting.

Safe use of insecticides

The insecticides mentioned in the preceding paragraphs have been recommended for use in the home garden because they are relatively safe to both the user and the consumer. Today many new and very powerful chemicals are excellent insecticides but are too dangerous to be used on

food crops in the home garden. Even with the safer materials, it is necessary to avoid skin absorption and breathing of the dusts or sprays. Wash immediately if any chemical comes in contact with exposed parts of your body and after each spraying or dusting. Natural rubber gloves should be part of your equipment. Store the chemicals in air-tight containers and out of the reach of children.

Buying chemicals

Garden chemicals may be purchased from various retail sources including farm-supply stores, mail-order houses, seed stores, hardware and drug stores, and the like. Most chemicals, with the exception of rotenone, store well and do not lose potency if held over to the next year. Therefore, you can make a saving by buying the standard 3-pound or 4-pound packages of chemicals such as used by commercial growers.

Method of application (sprays or dusts)

Many insects live and feed mainly on the undersides of leaves, and many plant disease organisms enter there also. To be really effective, chemicals must be applied with equipment that distributes the chemical over all surfaces of the plant. In general, this objective can be achieved better with sprays than with dusts.

Since dusting is quicker and more convenient, many gardeners successfully use this method by frequent and diligent applications. Dust applications in early morning or late evening, when leaf moisture is likely to be present and wind is at a minimum, are more effective than applications made when the plants are dry. Don't be afraid to apply the chemical before rainy periods as that is when the fungicides are most needed. Fungus-disease infection is most likely to appear when the leaves are wet. Sprays are used at the rate of 100 to 150 gallons per acre or from ½ to 1 gallon per 100 linear feet of row, depending upon the size of the plants. Dusts are generally applied at a rate of 30 pounds per acre, which is about ½ pound per 100 linear feet of row. These figures should serve as guides to determine the amount of chemical needed for any one season.

How much chemical to use

Usually, insecticides are recommended on an acre basis for the commercial grower. For dusting, the chemicals come already diluted to the proper strength and are ready to use in your duster. But a little figuring is usually necessary when you buy a wettable powder or an emulsifiable liquid to be mixed with water for spraying. As a general rule, for each pound of a wettable powder recommended per acre or per 100 gallons of water, use 1 tablespoonful per gallon of water; and for each pint of an emulsifiable

concentrate recommended for each acre or for each 100 gallons of water, use 1 teaspoonful for each gallon of water.

Dilution Chart

A dilution chart will help you to mix sprays or dusts. The symbols or abbreviations used in the chart are the following:

Symbols	Abbreviations	Liquid Measure
WP = wettable powder	*lbs.* = pounds	*3 t* = 1 T
E = emulsifiable concentrate	*oz.* = ounces	*2 T* = 1 ounce
T = level tablespoonful	*pt.* = pint	*16 T* = 1 cup — 8 ounces
t = level teaspoonful	*qt.* = quart	*2 cups* = 1 pint — 16 ounces

Chemicals	*Amount of chemical needed for*				
	100 gallons	*5 gallons*	*3 gallons*	*1 gallon*	*1 quart*
Insecticides:					
DDT					
50% WP	2 lbs.	10 T	6 T	2 T	1½ t
25% WP	4 lbs.	20 T	12 T	4 T	3 t
25% E	2 pts.	10 t	6 t	2 t	½ t
Malathion WP					
25% WP	3 lbs.	15 T	9 T	3 T	2 t
50% E	1½ pts.	7 t	4 t	1½ t	½ t
Methoxychlor					
50% WP	2 lbs.	10 T	6 T	2 T	1½ t
Nicotine sulfate					
40%	1 qt.	5 T	3 T	1 T	1 t
+ soap flakes		10 T	6 T	2 T	2 t
Fungicides:					
Fixed copper (50%)	4 lbs.	¾ cup	½ cup	¼ cup	2 T
Captan (50%)	3 lbs.	1¾ cup +2 T	1 cup +2 T	¼ cup +2 T	. .
Ziram	2 lbs.	1 cup	½ cup	2 T	. .
Zineb	2 lbs.	½ cup	¼ cup	2 T	. .
Maneb	2 lbs.	½ cup	¼ cup	2 T	. .

General insect pests

Aphids or plant lice

Aphids are small, soft bodied sucking insects (figure 21). They may be green, yellow, pink, gray, or black, depending on the species or kind. They cluster on the tender shoots and on the underside of the leaves and cause the leaves to wilt, curl, and turn yellow, and stunt the growth of the plant. They often coat the foliage with shiny, sticky material called *honeydew*. Aphids are most common on plants of the cabbage family, and on tomatoes, potatoes, peas, melons, and spinach; they may attack most crops at one time or another.

Figure 21. Aphids

Aphids can be controlled by sprays or dusts of malathion, nicotine, or possibly pyrethrum (pages 27 and 28). Treatments should be made as soon as they appear. Refer to the dilution chart (page 30) for dosages.

Cutworms

Cutworms (figure 22) are the larvae that hatch from eggs laid by moths that fly about and collect at lights during the night. They grow up to 2 inches in length and are smooth, fleshy, caterpillars, usually dingy brown in color. Some cut off plants at ground level while others feed on the fruit of tomatoes and the like. These worms feed at night and hide underneath stones and clods during the day. They can usually be found by looking under the surface of the soil about the plants.

Figure 22. A cutworm

One way to protect transplants from cutworms is to surround the stem closely with cardboard, extending below the soil surface and up to the lower leaves. Also dusting or spraying the soil surface around the plants with DDT or methoxychlor is effective if liberal and frequent applications are made.

Animals	*Method*	*Remarks*
Rabbits	Fencing	Completely enclose garden with chicken-wire fencing, 1-inch mesh, from 24 to 30 inches high. It must be anchored tightly to the ground
Rabbits, mice	Wire guards	Mainly for use on fruit trees
Rabbits, woodchucks, gray squirrels, red squirrels, raccoons	Shooting	A .22-caliber rifle is satisfactory
Rabbits, skunks	Trapping Box traps	For trapping or shooting of protected species, see game protector
Skunks, rabbits, woodchucks, raccoons	Steel traps	For woodchucks, place traps in or near burrows. For others, place in runways or feeding areas
Mice	Small snapback traps	Bait and set traps in runways, where possible. Use at least 12 traps
Moles	Special mole traps	Set traps as directed on cartons. Many farm and hardware stores carry these
Chipmunks, gray and red squirrels	Rat traps	Tie trap to tree branch and bait it with walnut or pecan
Woodchucks	Gassing	Kills the animals indiscriminately. Should be used only by a trained person
	Poisoning	Not recommended for those small animals in home gardens
Deer, rabbits	Chemical repellents	Not too effective. Sometimes suitable for protecting fruit trees

Slugs

Slugs often damage various garden vegetables during periods of cool, damp weather in the spring and the fall. The most common kinds are from ½ to 1 inch long, dark brown or gray in color, and soft and slimy to the touch. They appear on the surface of the ground to feed on the plants at night and remain underground during the day and in dry periods. They feed on almost any kind of plant, but are especially fond of cabbage and related crops, lettuce, peas, and beans. They chew ragged holes in the leaves and sometimes cut off the stems of small plants. They often eat into ripening tomatoes.

The most effective control measure for slugs is to use a special poison bait containing metaldehyde and sold under various trade names.

The baits should be scattered lightly over the ground around the plants in the evening. Dusting the soil around the plants in the evening with copper lime dust or a 5 per cent DDT dust is another effective method of control.

Small-Animal Pests

ONE of the best ways to control damage from small animals is to fence them out of the garden. Usually a chickenwire fence 24 inches high and tight to the ground is adequate. On the farm where electric fences are used, a 2-wire electric fence is sometimes used around the garden. The bottom wire is placed only a few inches above the ground to keep out small animals and the top wire is placed about 3 feet high to keep out large animals. The following chart suggests many control measures.

Individual Crops—Culture, Diseases and Insects

DETAILED suggestions on each crop regarding varieties, dates, rates of planting, amount of seed to buy, insect and disease identification and control, and average yields are given on the following pages and in the tables on pages 60 to 63.

Asparagus

Culture

Asparagus is a hardy perennial that is ready for eating early in the spring. One planting or bed lasts 15 or 20 years in a well-drained soil. Since it occupies the land for a period of years, plant asparagus where it will not interfere with plowing and fitting for other crops and where grass can be controlled.

One-year-old roots are likely to give the best results. Set them from 12 to 18 inches apart in a trench from 4 to 8 inches deep. The trenches should be from 3 to 5 feet apart if more than one row is needed. The roots first should be covered with only 1 or 2 inches of dirt. After the young plants are well above the ground, the trench can be gradually filled.

Asparagus should not be harvested until two years after planting. Beginning with the third season, keep the asparagus cut clean for four or five weeks. In the following years the harvest may extend over a period of two months. At the end of the cutting season give the bed a thorough cultivation and then allow all sprouts to grow to produce food to store in the crowns for next year's harvest. The old tops may be left over winter to help hold the snow and thus protect the planting. The tops may be re-

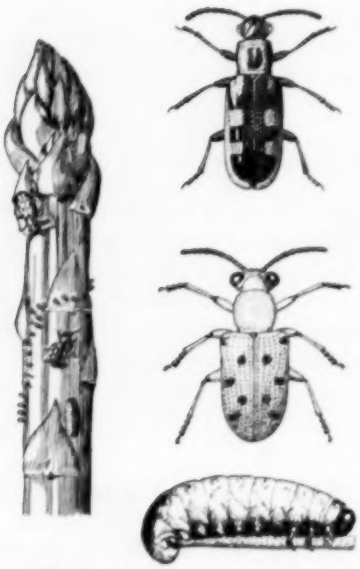


Figure 23. Asparagus beetles

Left: adult beetles, larva, and eggs on asparagus tip; *right:* common asparagus beetle; spotted asparagus beetle, and larva, or slug.

moved or may be worked into the soil early in the spring to add humus.

The asparagus bed should be fertilized the same as the rest of the garden.

Diseases

Rust appears as rusty or black pustules on stems and foliage. Mary and Martha Washington are resistant varieties.

Insects

Two species of asparagus beetles are commonly found on asparagus. One is the bluish black beetle with red and yellow markings, and the other is an orange beetle with black spots. They frequently cause crooked shoots and scar the tender tips. They also cover the spears with numerous small black eggs standing on end. Both the beetles and their grayish worms weaken the plants by devouring much of the foliage.

To control these beetles, leave a few trap plants to dust or spray with rotenone or pyrethrum during the cutting season. In newly set beds, and after old beds have developed foliage, make applications of rotenone or DDT if beetles are present, both to protect the plants and to reduce the number of beetles the following season. Use only rotenone or pyrethrum on spears during harvest to control these pests.

Beans

Culture

Snap beans are a tender crop, easily killed by frost. They yield heavily in relation to the area occupied, and are easy to grow. The first planting may be made slightly before the average date of the last killing frost in spring, and successive plantings may be made until the middle of July or later in many parts of the State.

Lima beans require a longer and a warmer growing season than do snap beans. They seldom produce a successful crop in the cooler parts of New York. The bush, or dwarf, type of lima bean matures earlier than does the pole type.

Edible soybeans are desirable in the home garden primarily for green-shell beans. They are a tender crop and need a long growing season, but are seldom troubled by insects or diseases. The green beans may be stripped from the pods easily if they are dipped in boiling water.

Figure 24. Bacterial blight of bean

Diseases

Mosaic is characterized by leaf mottling and plant dwarfing. It is caused by a virus that may be carried in the seed or transmitted by aphids (plant lice) in the garden. Control by using one of the following mosaic-resistant varieties: Contender, Top Crop, Rival, Wade, Full Green, or Scotia. Destroy mosaic plants as soon as they appear in the garden.

Bacterial blight appears on the leaves as large brown splotches with yellow-red borders. The stems may be girdled, and water-soaked areas on pods may develop. The disease is seed-borne, so buy western-grown seed. Tendergreen and Scotia have some resistance. Do not work among wet plants.

Anthracnose browns the leaf veins and produces sunken spots on the pods. These spots may have pink centers. The disease is seed-borne and carried over in crop refuse. Scotia and Logan have some resistance. Do not work among wet plants. Practice rotation.

Control summary

1. Plant disease-resistant varieties whenever possible.
2. Use western-grown seed.
3. Plant beans in a new area each year (rotation).
4. Do not work in beans when the leaves are wet.

Insects

The *Mexican bean beetle* commonly injures snap, lima, and field beans. Black spotted yellow beetles (figure 25), yellow eggs, and spiny lemon colored grubs, are found on the underside of the leaves. The beetles eat holes through the leaves; the grubs eat all except the thin upper epidermis and veins, giving the leaves a lacework appearance. The beetles and grubs also eat into the pods.

Figure 25. Mexican bean beetle
Left, egg mass; *right*, spiny larva; and *bottom*, spotted adult beetle

To control the bean beetle, apply rotenone or methoxychlor dusts or sprays to the underside of the leaves. Start treatments when the beetles appear on the plants, and repeat the treatments at about 10-day intervals until the beetles are controlled. Early beans usually require treatment about June 15 in southeastern New York and June 25 in upstate New York. Late beans are attacked by the second brood in August.

Bean maggots are small, white, and legless. They live in the soil and injure germinating bean seeds, particularly in late May. Injured seeds may fail to come up or may come up and fail to develop leaves.

To reduce injury from bean maggots, plant the seed shallow to give a quick "come-up." Use plenty of seed when planting. For further control on maggots, refer to seed treatment on page 16.

Bean-weevil adults lay eggs on bean pods in the garden. The worms from these eggs go into the developing beans and are present in the beans when harvested. The worms inside the beans become adult weevils; these increase rapidly if stored in a warm place. These "buggy" beans are unfit for food or seed.

Use rotenone or methoxychlor regularly to prevent infestation in the garden. Store the beans in a tight container, preferably in an unheated room where the temperatures go below freezing. Also, the beans may be spread out in a shallow open container and placed in the oven for one hour at a temperature of 125°F. This kills weevils that are present in the beans.

Beets

Culture

Beets are easily grown, yield heavily, and are rich in vitamins and iron, especially when the tops are included for greens. They are so hardy that the seed may be sown about as early as the ground can be properly fitted in the spring. Very early beets are obtained by starting the plants indoors from six to eight weeks before the seed can be sown in the open and setting the plants in the garden at seed-planting time.

Diseases

Cercospora leaf blight is the only common disease of beets. This causes numerous brown spots with purple margins on the leaves. Apply fixed coppers, zineb, ziram, or maneb only if disease appears.

Broccoli, Green-Sprouting

Culture

Broccoli is a hardy, easily grown, highly nutritious crop that is rapidly gaining in popularity with gardeners. It is similar to cauliflower, except that it is green and has a more open head. Unlike cauliflower, sprouting broccoli continues to bear throughout the season and requires no blanching.

Early plants may be started in the window box or the hotbed from six to eight weeks before they are to be planted in the garden.

The edible part of broccoli, the head, is a cluster of green flower buds, and should be cut, with 6 to 8 inches of stalk, before the buds open. After the main cluster is cut, small lateral clusters will continue to develop throughout the growing season. The plants are very hardy in the fall and will continue to grow until severe freezing weather. Its general culture requirements are similar to those of cabbage. See *Cabbage*, page 37.

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Brussels Sprouts

Culture

Brussels sprouts are not considered easy to grow but do best if started in an outdoor seedbed in late May and set in the garden in midsummer. They can be harvested for a considerable period by picking the lower sprouts as soon as they become large enough. The leaf below each sprout usually is broken off so that the sprout may be picked conveniently. The plant continues to produce more leaves and sprouts at the top. About the time of late-cabbage harvest or severe freezing weather, pull the Brussels sprouts plants or cut them close to the ground and stand them up, pack them tightly together in a cool cellar, or cover them lightly with hay in a garage or under an open shed. After the plants are stacked, the sprouts may be picked any time during the winter.

This crop has the same culture requirements as cabbage. See *Cabbage*, page 37.

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Cabbage

Culture

Cabbage, a popular vegetable high in vitamin content, is easily grown. By a wise selection of varieties and by planting at the proper time you

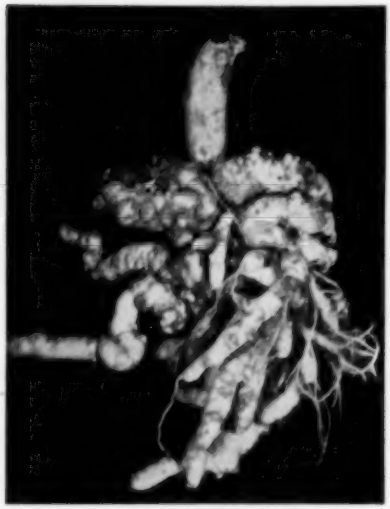


Figure 26. Club root of cabbage

may have fresh cabbage for several months. The time can be lengthened by storage.

Cabbage needs abundant moisture and fertilizer, and will not do well on very acid soil. Where the soil is highly acid, below pH 5.5, lime generally can be used with profit. Cultivation should be shallow because a large proportion of the cabbage roots develop near the surface of the soil and run almost horizontally across the rows.

Diseases

Club root, characterized by large swellings on the roots, dwarfs and yellows the plants. This fungus is not seed-borne although it frequently gets into gardens in soil clinging to roots of transplants. Club root does best in acid soils. Do not put cabbage where it has been grown for at least six years. Apply lime to make the soil neutral. Refer to control summary.

Yellows, a fungus disease, causes yellowing and dwarfing of the entire plant. Produces brown specks in the cut stem. The fungus lives in soil for many years. Best control is to use a resistant variety such as Golden Acre, Marion Market, Racine Market, Badger Market, Jersey Queen, Copenhagen, Empire Danish, Resistant Glory, or Improved Wisconsin Ballhead.

Black rot may kill young plants or completely rot the heads. It produces black specks in the cut stem. Black rot is a seed-borne bacterial disease; thus, seed should be hot-water treated by seedsmen. This treatment along with a long rotation controls the disease.

Downy mildew appears as a slight yellowing on the upper leaf surfaces with a white powder on the corresponding lower sides. Usually only the lowest leaves on the plant are infected. Control is difficult during periods of high humidity but Spergon, 2 tablespoonsful to 1 gallon of water, applied every 4 or 5 days, should be helpful.

Control summary

1. Plant varieties resistant to yellows.
2. Use only hot-water-treated seed (page 16).
3. Make from 2 to 4 applications of 1–2000 corrosive sublimate solution (one 8-grain tablet dissolved in 1 quart of warm water) in the seedbed,

pouring it along the row at the rate of 1 pint to 5 feet of row, but do not wet the foliage.

4. If club root has been troublesome, pour about 1 cupful of a calomel suspension (1 ounce in 6 gallons of water) into each dibble hole as the plants are set out.
5. Grow the plants on neutral or alkaline soil (above pH 7.2).
6. Practice a 4- to 6-year rotation.

Insects

The *cabbage maggot* often injures cabbage and related crops, attacking the transplants of early crops and the seedlings of later crops during May and early June. The small, white, legless maggots feed on the roots and underground stems. Injured plants are sickly and stunted, and some wilt and die.

To protect plants in the seedbed, make three applications of the corrosive sublimate solution as given under cabbage-disease control summary 3 on page 38 at weekly intervals, starting 5 days after the plants appear. A transplanter solution containing an insecticide may be used in the transplant water when the plants are set out. Corrosive sublimate solution at a 1–2000 dilution kills cabbage-maggot eggs. To protect transplants by this method, pour ½ cupful of solution around the base of each plant 5 days after transplanting, and repeat twice at weekly intervals.

Figure 27. Cabbage maggot fly
Top, adult; *center*, pupa; *bottom*, larva

Cutworms sometimes destroy cabbage plants just after they are set out. Suggestions for their control are given on page 31.

The *imported cabbage worm* and the *cabbage looper* commonly damage cabbage and related plants, particularly broccoli, brussels sprouts, and cauliflower.

To control cabbage worms, use DDT or DDT-malathion combination on cabbage and related crops up to the time of head formation. Do not use DDT on these crops after the heads start to form. Malathion may be used after head formation

but not closer than 10 days to harvest. Pyrethrum dust can be used after head formation and during harvest on cabbage and related crops.

Aphids (figure 21) are sometimes a serious pest on cabbage and similar crops. Use malathion or pyrethrum for aphid control. Refer to the dilution chart (page 30) for dosages of insecticides.

Carrots

Culture

Carrots, an excellent source of vitamin A, are used almost daily by the housewife. They are easy to grow and store, and only a small space is required to grow a season's supply.

Carrots, like other root crops, thrive best during a cool season and in a deep and fertile soil, well supplied with moisture. They are hardy, and may be planted as soon as the garden can be worked. The late crop for winter storage should, however, not be planted before mid-June.

Carrot seeds are slow to germinate, and need careful attention in planting to assure a good stand. In dry weather the seedbed may be sprinkled each evening for from ten days to two weeks to insure a quick come-up and a good stand. Another way to get a better-than-usual stand of carrots in dry weather is to make a furrow approximately 2 inches deep. Sow the seed in the bottom of this furrow and cover it with only from ¼ to ½ inch of soil. Boards or papers laid over the furrows until the seeds germinate give still further protection against drought injury.

Carrots can be weeded by spraying with dry-cleaning fluid (undiluted) at the rate of 1 quart for each 100 feet of row. The spray should be applied when the weeds are not more than 2 inches high. To prevent undesirable flavors, dry cleaning or oil sprays should not be used after carrot roots become as large as a lead pencil. The same spray can be used on parsnips, parsley, and dill.

Diseases

Leaf blight may be serious during cool wet seasons. If it appears, apply fixed copper, captan, or zineb every week.

Yellows causes purpling of the tops and the development of numerous hairy roots on the carrot. This virus is spread by leafhoppers from asters, certain weeds, or other diseased carrots. Control by regular applications of DDT.

Insects

A *small maggot*, the immature stage of the *carrot rust fly*, sometimes damages carrots early in the season to cause spangled and stubby carrots. Either planting after the first-brood maggots appear (after June 1 in some areas of

New York) or planting seed treated with an insecticide has helped to prevent this injury. Harvesting early in September before the second-brood maggots have a chance to burrow into the carrots is very helpful.

Leafhoppers transmit a disease to carrots known as *carrot yellows*. Late in July or early August the leafhoppers usually migrate into carrots. If carrot yellows is a problem in your garden, make several applications of DDT at 10-day intervals when you first observe leafhoppers.

Cauliflower

Culture

Cauliflower is a difficult crop to grow. Like cabbage, it thrives best in cool and moist weather; but unlike cabbage, it will not withstand severe freezing or extreme heat. It is sensitive to a soil reaction below pH 6.0. The young plants may be set in the garden as early as cabbage is set, for it is only the matured heads that are not resistant to severe freezing weather. The late crop is more likely to be successful than is the early crop, except in mountainous sections of the State where the summer months are cool.

Cauliflower must be blanched to get a white head. Blanching is done by tying the outside leaves together as soon as the curd (head) has reached a diameter of 2 or 3 inches. Examine the heads every day or two to make sure that they do not pass the proper stage of maturity before harvest. Harvest the curds when they are still compact, not open and "ricey."

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Celery

Culture

Celery is difficult to grow and is not recommended for the average home garden. It thrives best when the weather is relatively cool and the moisture supply is abundant. The soil must be well drained, fertile, and well supplied with humus. The soil reaction must be pH 6.0 or above because celery is sensitive to highly acid soils.

The seeds may be started in a hotbed or window box but because of the difficulty of getting the young plants started, most gardeners prefer to purchase plants. Set the plants 6 inches apart, in rows 18 inches apart for self-blanching or up to 4 feet apart for blanching with soil. Celery responds well to two or three side-dressings of nitrate of soda at the rate of 1 pound to each 100 feet of row at 3-week intervals after the plants are in the garden. Ammonium nitrate may be used at one-half of this rate. Scatter the nitrate from 4 to 8 inches away from the row and stir in lightly with a hoe, rake, or cultivator.

Blanching is done by excluding light from the stalks while they are still growing, such as close planting or the use of boards, paper, or soil around the plants. Heavy paper may be fastened tightly against either side of the row or a few plants may be blanched at a time by wrapping newspaper around the individual plants, or by using special individual blanching tubes which are available at many seed stores. Also, clay drain tile may be used. Banking with soil is not safe in hot weather, but it is the most economical method for fall blanching as it also protects the plants against freezing weather. In summer, a period of from ten days to two weeks is required for blanching. A somewhat longer period is necessary in the fall.

Diseases

Early and *late blight* are both fungus diseases that severely spot and yellow the foliage. They are seed-borne on new seed and live overwinter in refuse in or on the soil. Use seed at least 2 years old. If these diseases appear, use captan, ziram, zineb, or fixed copper every week.

Yellows disease cause yellowing, dwarfing, and bitterness. The fungus lives in the soil for several years. Use resistant varieties, such as Summer Pascal, Salt Lake, Cornell 19, Cornell 6, Emerson Pascal, Michigan Golden, or Golden Plume.

Control summary

1. Select yellows-resistant varieties.
2. Use seed more than 2 years old or treat the seed with hot water (page 16).
3. Rotate the planting site.
4. Spray or dust with fixed copper, captan, or zineb at 7-day to 10-day intervals throughout the season.
5. Keep out of the celery bed when the plants are wet.

Chard

Culture

Chard is recommended for summer greens because it withstands heat much better than does spinach. Its culture is similar to that of spinach but the crop should be thinned so that the plants stand from 4 to 8 inches in the row. If only the outer leaves are removed in harvesting, a single planting will produce all season.

Chinese Cabbage

Culture

Chinese cabbage requires a rich soil, an abundance of moisture, a cool season, and short days. If planted much before July 1, it will go to seed

without heading. When grown quickly it is a delicious salad crop, often used as a lettuce substitute or it may be cooked as is common cabbage. The crop is not easy to transplant, and therefore does best if the seeds are planted in the row where they are to mature.

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Cucumbers

Culture

Cucumbers are a frost-sensitive crop. They may be planted either in hills or in rows. A few plants will produce a large number of cucumbers if the fruits are picked when they are young. The long varieties, which are used primarily for slicing, are equally good for pickling if the fruits are removed when small. The crop does well on a wide range of soils and responds to heavy applications of humus, especially manure.

Diseases

Mosaic mottles and distorts the leaves and fruits. It frequently causes bitter fruits to form. The virus overwinters in perennial plants, such as

Figure 28. Virus mosaic of cucumber

milkweed, pokeberry, catnip, motherwort, phlox, and plantain, and is spread from them by sucking insects. Niagara, Yorkstate Pickling, Ohio MR-17, and Wisconsin SMR-12 have resistance to mosaic.

Bacterial wilt causes sudden wilt of individual runners and eventually of the entire plant. The bacteria overwinter only in the bodies of cucumber beetles and then are spread by the beetles to young cucumbers in the spring. Excellent control results from using insecticides to prevent any beetle feeding. This is very important and must start as soon as the new plants appear above the ground.

Powdery mildew is characterized by a white, powdery growth on the upper sides of the leaves that causes drying and death. Mildew is not seed-borne. If necessary, dust lightly with a mixture of sulfur-melon dust (1–4). Heavy applications of sulfur injure the plants.

Anthracnose, *scab*, and *blight* are fungus diseases that spot the leaves and fruit and may cause fruit rots. These diseases are carried in the seed and are killed by seed treatment with corrosive sublimate (page 16).

Control summary

1. Use corrosive-sublimate-treated seed (page 16).
2. Rotate the planting site.
3. Dust or spray weekly with ziram or captan, including an insecticide such as rotenone or methoxychlor.
4. Prevent all perennial weed growth in and around the garden.

Insects

Cucumber beetles are a problem in cucurbits from the time the plants appear above the ground and during most of the season. The *striped cucumber beetle* (figure 29) is a small yellow insect with black stripes and head. The *spotted cucumber beetle* (figure 30) is yellow with black spots and head. The beetles chew the leaves, often girdle the stems and shoots, spread bacteria, and injure blossoms and fruits. Their slender grubs tunnel in the underground stems and roots.

To control cucumber beetles, a dust or spray of rotenone or methoxychlor may be used. Make applications at 4-day or 5-day intervals from

Figure 29. The striped cucumber beetle

Figure 30. The spotted cucumber beetle

the time the plants first show above the ground until they start to run. The first few weeks are the most critical period for beetle injury. Plants started under hotcaps should be treated as soon as they are opened.

Eggplant

Culture

Eggplant is grown similar to tomatoes (page 57).

Diseases

Verticillium wilt causes leaf browning and severe stunting. The fungus enters the food transport system of the plant through the roots from the soil. No satisfactory control has been devised, although rotation may help.

Endive

Culture

Endive is commonly thinned, tended, and used in much the same manner as is head lettuce, but some persons prefer it cooked as greens. When the plants have become large enough, draw the outside leaves together over the head and fasten them with a string or a rubber band. You may use an inverted berry box instead. Blanching should be done two or three weeks before the plants are to be used, to remove the bitter flavor.

Kale

Culture

Kale is a hardy crop that belongs to the cabbage family. It grows under the same conditions as does cabbage, and tastes much like it, but it does not form a head. It is a good source of greens in late fall and early spring. In many parts of the State it lives in the garden and is edible throughout the winter. For the fall and winter crop, sow the seed in July.

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Kohlrabi

Culture

Kohlrabi is grown for the turnip-like enlargement of the stem above the

ground. It is cooked as is cauliflower, and is an excellent vegetable if used while tender. It is an easily grown and a quick-maturing crop. Kohlrabi must be harvested when between 1½ and 3 inches in diameter, or it will become tough and stringy. It is a hardy vegetable and will grow equally well on rich soil with an adequate moisture supply in either hot or cold weather.

Diseases and Insects

See *Cabbage*, pages 38 to 40.

Lettuce

Culture

Since lettuce is a hardy, cool-season crop that thrives best in early spring, the first plantings need not be so large as those made in late June or in July. It is grown on practically every kind of soil, but does best on a fertile loam well supplied with fertilizer. Lime is suggested if the soil tests below pH 6.0. Ample soil moisture must be maintained at all times.

The two principal types of lettuce are loose-leaf and head. The loose-leaf type is usually most satisfactory for the inexperienced gardener. Head lettuce may be of either the crisp or the "butter" (Boston) type. Head lettuce is most likely to form good heads if started very early in the spring.

Muskmelons

Culture

Muskmelons require a warm season. In the cooler sections of New York they are not likely to produce a satisfactory crop unless they are started in pots indoors. About a month before the average date of the last killing frost, four or five seeds may be planted in each of several individual pots containing fertile soil of a light texture. Allow only two or three plants to grow in each pot. After all danger of frost is past, remove the plants, with soil intact, from the pots and set them in the field. Each pot makes one hill. From eight to ten hills are usually enough for the average family. Muskmelons are sensitive to highly acid soils, less than pH 6.0, and are benefited by liberal applications of manure.

Allow the muskmelons to remain on the plants until they slip easily from the stem.

Diseases

Fusarium wilt is a serious fungus wilt disease when melons are grown in old melon soil. The fungus enters through the root system causing brown streaks in the underground stem. Except for these streaks, this disease can

be confused with bacterial wilt. Chemicals are of no benefit. Plant resistant varieties, such as Delicious 51, Iroquois, or Harvest Queen.

Other diseases. See *Cucumbers*, page 43.

See *Cucumbers*, page 43.

Onions

Culture

Onions are best grown from plants or from sets which are small onions grown from seed during the previous season. Sowing seed is satisfactory for growing green onions or for growing mature onions on muck soils. Sets more than ¾ inch in diameter are likely to go to seed before producing a crop. Sets smaller than ½ inch develop too slowly. The sweet Spanish type of mild onions produces a good crop if grown from plants.

Onion seeds, sets, and plants should be planted as early in the spring as the ground can be prepared. If green onions are desired, plant them close and thin them as they grow, leaving those which are to mature about 3 or 4 inches apart.

Onions will not keep well unless they are allowed to ripen before harvesting. The tops should fall over and dry down, and the outer skin of the bulbs should be dry before the onions are pulled.

The tops normally fall over during the ripening period. Lower yield and poorer keeping quality may result from knocking them over. Onions should be thoroughly dried and cured immediately after pulling.

Parsley

Culture

Because of the slow germination of parsley seed and the delicate seedlings produced, it is best to sow the seed under glass or in an open seedbed and to transplant the seedlings later to the row in the garden. Another procedure is to sprout the seed according to the method recommended for carrots (page 40). Since the plants are hardy, you may start them at almost any time during the winter in window boxes and set them in the garden as soon as the soil can be prepared. If only part of the leaves are removed for use, the plant will continue to grow and will produce an abundant supply of leaves throughout the season until very severe freezing weather in the fall.

Parsnips

Culture

Parsnips require a much longer growing season than do beets and carrots. The seed is usually sown early in May, and preferably is mixed with radish seed to help mark the row until the parsnips get started. To produce a crop of large, smooth roots, parsnips need a deep loose soil that is

rich in humus and well fertilized. Parsnips may be weeded by spraying in the same manner as recommended for carrots (page 40).

Leave the parsnips in the ground until late in the fall. They have a better flavor and a better quality if they are exposed to temperatures near freezing for two or three weeks before eating.

Diseases

The only disease that may bother parsnips is *blight* or *canker*. This fungus disease begins as a leaf blight and then drops to the roots where it causes chocolate-brown discoloration on the crown and side of the parsnip. In wet seasons, spraying every 10 days with fixed copper, beginning July 15, gives control. High ridging of the crown in August is also helpful.

Peas

Culture

Peas thrive best in cool weather and should be planted as soon as the ground can be worked in the spring. The best way to get a succession of peas is to plant three or four varieties requiring different lengths of time to mature. These should all be planted at the same time and as early as possible.

Most home gardeners prefer to plant the dwarf varieties of peas rather than the tall-growing sorts, as the dwarf ones need no brush nor wire netting for support.

Since peas stay at the best table quality for only a relatively short time, harvest them when in prime condition and eat or preserve them as soon as possible after harvest. The higher the temperature, the more rapidly peas will pass the best edible state. Peas, blanched and quick frozen, can be held in good condition for a year or more.

Diseases

Fusarium wilt is a fungus disease that causes plants to turn yellow, wilt, and die after pods have set. Plants may break over at the soil line. The disease is favored by high soil temperatures. Rotations help, but chemicals are of no benefit. Plant resistant varieties, such as Resistant Alaska, Surprise, Early Harvest, Alderman, or Wisconsin Perfection.

Powdery mildew forms a white coating on the leaves, pods, and stems. The leaves turn yellow and curl. Make applications of sulfur as a spray or dust weekly, beginning at the first signs of mildew. A mixture of 4 parts of sulfur and 6 parts of lime may be used as a dust.

Mosaic. Several virus diseases may attack peas and cause severe leaf mottling, stunting, and poor pod production. These viruses are spread by sucking insects; therefore, early and regular applications of insecticides help to control this group of diseases. Avoid proximity to alfalfa or clover fields.

Control summary

1. Treat seed with spergon, arasan, or captan before planting.
2. Rotate the site for peas.
3. Plant early while soils are cool.
4. Apply insecticides early and regularly.

Insects

Aphids are troublesome in some seasons. Use malathion according to dosage given in dilution table on page 30.

Peppers

Culture

The culture of peppers is similar to that of tomatoes. Peppers are likely to yield poorly if hit by hot dry winds or drought. Irrigation and mulching are recommended. Too much fertilizer or too much water may result in excessive top growth and little or no fruit.

Diseases

Bacterial spot causes wart-like, raised spots on leaves and fruits. Leaves may yellow and drop. The disease is seed-borne. Soak seed for 5 minutes in corrosive sublimate (1–3000), then wash repeatedly in water, and dry.

Mosaic causes mottling and slight yellowing of leaves followed by leaf drop. Fruits may be mottled or actually develop large black spots. In field, isolate from pepper plants, tomatoes and cucumbers if possible because aphids spread the virus from these to peppers. Use insecticides early on peppers. Wash your hands with soap between time of handling tomatoes and peppers. Yolo Wonder, Wisconsin Lakes, and Burlington have mosaic resistance.

Sunscald appears on the fruit as large sunken areas, with a gray paper appearance. Give plants plenty of soil moisture and fertility, and avoid varieties with sparse foliage.

Insects

Aphids are troublesome in some seasons. Use malathion according to dosage given in dilution table on page 30.

Potatoes

Culture

Since potatoes require considerable space and a deep loose soil, and since they are susceptible to many diseases and insects, probably most gardeners should not attempt this crop.

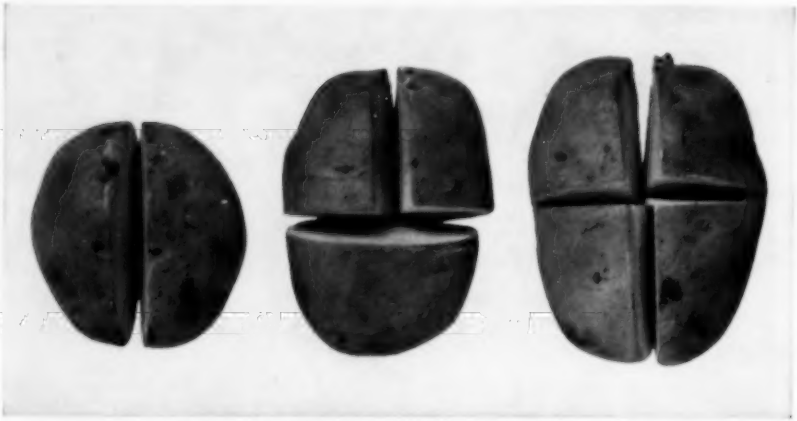


Figure 31. Methods of cutting tubers for seed

Left to right: Tuber weights, 3, 4, and 6 ounces; weight of seed pieces 1½, 1⅓, and 1½ ounces

Small potatoes, from 1¼ to 2 ounces in weight, may be planted whole but larger ones are cut into blocky pieces of approximately 1½ ounces each (figure 31). One eye on each piece is needed, and it is safer to have two or more eyes to the piece.

The seed pieces are best cut at least one day before planting. Immediately after cutting, put the pieces into a tight container and keep it covered and in a warm room for twenty-four hours to assist healing. These pieces may then be planted, but can be kept for a week or two after cutting if necessary.

Early varieties are likely to do best if planted as soon as the ground is in good condition for planting. Late varieties may be planted as late as June, but frequently produce more if planted early.

Under most conditions deep planting followed by level cultivation or moderate hilling is better than shallow planting and high ridging. Seed pieces may be planted 3 or 4 inches deep in furrows or in individual holes dug with a hoe. They will make the quickest come up and the best growth if covered only about ½ inch deep. The balance of the hole may be filled in after the plants are 3 or 4 inches high.

Diseases

Virus diseases (leafroll, mosaic, spindle tuber, yellow dwarf) are distinct diseases caused by specific viruses. Symptoms include one or more of the following: (1) rolling of the lower leaves which become leathery; (2) mot-

tling of the leaves; (3) stunting of the entire plant; (4) production of small, misshapen tubers. These viruses are carried by infected seed and by sucking insects. The use of *certified* seed is a most important control measure. Also, early and regular applications of insecticides reduce spread in the field. Do *not* save your own seed for planting.

Scab produces scabs or pits on the tubers. This bacterial disease is both seed- and soil-borne. Scab is favored by alkaline or neutral soils and is greatly inhibited below pH 5.6 (acid). Moist cool soils appear to reduce the severity of scabbing; therefore, irrigation may be helpful. Ontario, Cayuga, and Cherokee have some resistance to scab.

Bacterial ring rot is a serious tuber rot disease that causes varying degrees of rot in individual hills. Some tubers may be completely rotted, others only soft rotted at the stem end, with still others apparently healthy. Look for the yellow cheesy ring about ¼ inch below the skin. Top symptoms develop late in the growth period as wilting of the lower leaves with yellowing between the leaf veins. Single stems may first develop symptoms. The best control is to use only *certified* seed. Sprays or dusts or seed treatments have no benefit.

Early blight is a fungus disease that causes black, target-shaped spots on the lower leaves. In cool wet seasons much leaf surface can be destroyed by this disease. Early blight does not affect tubers. Spraying or dusting with fixed copper, zineb, ziram, or captan controls the disease.

Figure 32. Potato leafroll

Figure 33. Late blight of potato

Late blight is a very serious fungus disease that affects tubers as well as tops. It appears suddenly, like premature frost injury to the plants. With light infections, only individual leaves may develop wet, gray spots beginning at the leaf margins and with mold evident on the undersides of wet leaves. Blighted tubers have corky, brown, firm rot layered just under the skin. The fungus is seed-borne and may overwinter in potato cull piles. Blight is favored by cool temperatures and abundant leaf moisture and high humidity late in the season. Strict frequent applications of fixed copper, zineb, or bordeaux mixture during these periods helps to control blight.

Hopper burn causes tip-burning of the leaves, giving a brownish cast to the plants and resulting in premature death. Often confused with maturity. Toxins produced by potato leafhoppers cause the killing. Control the leafhoppers by regular applications of insecticides until harvest approaches.

Control summary

1. Use only *certified* seed from a tagged bag.
2. Destroy volunteer potato plants in the garden or dump.
3. Apply fungicides and insecticides on a 7- to 10-day schedule, beginning when the plants are 6 inches high. Use bordeaux, fixed copper, or zineb for late blight; otherwise ziram, captan, zineb, or fixed copper on a regular schedule.
4. If late blight has appeared, do not harvest until 10 days after tops have died. Then dig on a sunny, dry day.
5. Plant potatoes in acid soil where the pH is 5.6 or lower.
6. For further detailed information on potato diseases and insects, refer to Cornell Extension Bulletin 890, *Potato Production in New York State*.

Figure 34. Potato beetle
Top to bottom: eggs, adult, pupa, and larva

Insects

Many insect pests usually appear on potatoes every season. The small black *flea beetles* begin feeding on po-

tatoes as soon as they break through the ground. The *Colorado potato beetle* (figure 34) and their orange-reddish colored slugs practically defoliate plants, while flea beetles make numerous small holes in the leaves. *Leaf-hoppers* hide on the underside of the leaves, suck the sap from them and cause the leaves to turn up and brown. *Aphids* suck the plant juices from the underside of the leaves and cluster on the flower stalks.

For control of beetles and leaf hoppers, use a DDT spray. Make the first application when these insects appear. If aphids are also a problem, add malathion to the spray. Refer to dilution chart on page 30 for dosages.

Radishes

Culture

Radishes are hardy and mature quickly. The small round varieties develop more quickly than do the long ones. If radish seeds are mixed with carrot and parsnip seeds to mark the rows for early cultivation of the latter crops, it may not be necessary to make any separate planting of radishes. All radishes planted in carrot or parsnip rows should be pulled as soon as they are ready to eat.

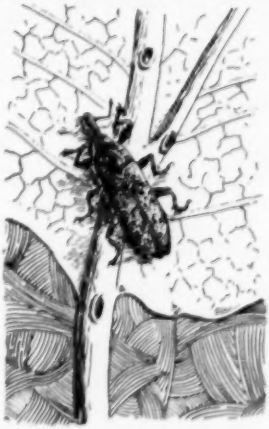
Rhubarb (Pieplant)

Culture

Rhubarb is propagated by root division because there is too much variation in plants grown from seed. The old crowns may be cut into as many pieces as there are strong buds. Before growth starts each spring, give the bed a thorough but shallow harrowing or cultivating. Apply the same kind and amount of fertilizer as that used on the rest of the garden just before this harrowing, to mix the fertilizer in with the soil.

From a new planting no rhubarb should be harvested the first year and only a small harvest should be made the second year. After this a full crop can be harvested for eight to ten weeks each spring. If rhubarb becomes unproductive, it is advisable to check for root rot and soil acidity. If root rot is present, it is best to start a bed with new plants.

Figure 35. Rhubarb curculio



Insects

The *rhubarb curculio* is sometimes a pest of rhubarb when it punctures the stems with its snout and causes a gummy substance to exude at the punctured spots. Occasionally a white

grub, the immature stage of the curculio bores within a stem.

This insect can be controlled only by hand-picking and destroying the grown beetles in early June when they are seen on the stalks. The beetles are about ¾ inch in length, hard shelled, have a prominent curved snout, and a yellowish pollen-like powder on their bodies.

Rutabagas

Culture

Rutabagas are similar to turnips except that they have smooth instead of hairy leaves. They also have a larger and rougher root, and require a month longer to mature.

Salsify

Culture

Salsify culture and requirements are similar to those of parsnips (page 47).

Spinach

Culture

Spinach is a hardy crop that thrives best in cool weather. It will withstand freezing better than will most vegetables, but it produces seedstalks during the long, hot days of June and July. New Zealand spinach or Swiss chard should be grown for summer greens.

Spinach can be grown in any good soil that is well fertilized and not too acid. It seems to do best in a soil with a pH of 6.0 to 6.7. As with all other vegetable crops, shallow and clean cultivation is essential.

Diseases

Seed rot and *damping-off* result in poor stand.

Mosaic, or *yellows*, a virus disease, may seriously affect the fall crop. Virginia Savoy is resistant to this disease.

Control

To control these diseases, treat the seed as recommended on page 16. Plant Virginia Savoy for the fall crop.

Squashes and Pumpkins

Culture

The culture of squashes and pumpkins is similar to that of cucumbers and muskmelons except that they are spaced somewhat further apart and are not so sensitive to acid soils as are muskmelons.

Insects

Cucumber beetles. See *Cucumbers*, page 44.

Squash bugs may seriously injure winter squash and to a lesser extent summer squash and pumpkins. The brownish adults and grayish young insects feed in groups on the underside of the leaves, suck out the plant juices, and cause individual leaves to wilt and then to blacken and die. Injury can be prevented by hand picking the grown bugs. A shingle-like board placed at the base of each plant will trap the grown bugs at night where they can be found and destroyed in the early morning. When large numbers of the immature stages of the bugs are present, a 1 per cent rotenone dust or a pyrethrum dust should give satisfactory control.

The *squash borer* is a large, whitish grub that burrows into the stem causing the plant to die. An external indication of the approximate location of the grub is the presence of sawdust-like frass extending out of the stem. The borer may be killed without injury to the plant by puncturing the borers with a sharp wire, or by cutting a longitudinal slit in the stem with a thin-bladded knife and taking the borer out. Mound some soil over the slitted stems to help maintain further life in the injured plant.

A satisfactory preventative of squash-borer injury is to dust the plants four or five times during the growing season at weekly intervals with a 1 per cent rotenone or a 5 per cent methoxychlor dust, beginning about June 15 in the southeastern part of the state and about June 20 in upstate New York. It is important to maintain a good dust deposit on the larger stems near the ground level in order to kill the worms before they go into the stem.

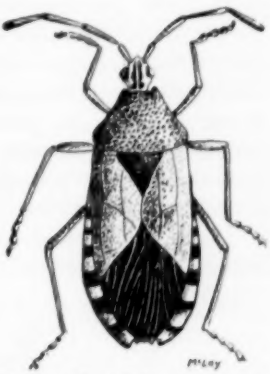


Figure 36. Adult squash bug

Sweet Corn

Culture

Sweet corn is susceptible to frost injury and grows best in hot weather, but will withstand more cold than will cucumbers, muskmelons, pumpkins, and squashes. It is one of the most important home-garden crops in this State.

To have a constant supply of corn for the table from midsummer to frost, plant early, midseason, and late varieties at about the same time. Also, you should make two or three additional plantings of the late varieties when the youngest planting is an inch or two above ground. To make sure of good pollination and a full set of kernels on the cob, plant at least three adjacent rows of each variety at each planting.

On Long Island and in sections of the Hudson Valley sweet-corn suckering (removal of the side shoots at the base of the main stalk) is still practiced. Since many years of experimental work have failed to substantiate the claimed benefits from this practice, suckering is not recommended.

Diseases

Smut produces large black growths or "smut boils" on the ears or blisters on the leaves or tassels. The fungus lives in the smut boils that drop to the soil and remain on the soil surface. Chemicals are of no benefit. Hand picking and burning of boils may reduce disease the next season.

Stewart's wilt is a bacterial disease of considerable importance in early sweet corn. It causes long streaks on the leaves parallel with the mid-rib. These are at first light green, then yellow, and then brown. Wilt of the entire plant or death may result. The disease is introduced into corn and spread in the field by the feeding of the corn flea beetle, a tiny black insect. Early regular applications of DDT, beginning at emergence and every 5 days until silking, gives measurable control. Varieties such as Golden Beauty, Golden 25, Golden Harvest, Evertender, Iochief, Seneca Chief, Golden 50, Sweetangold, and Calumet appear to have considerable resistance to Stewart's wilt.

Figure 37. Corn borer

The corn earworm eats the kernels at the tip of the ear but does not go into the cob. The corn borer burrows into the cob, the tassels, or the stalk

Insects

The *corn flea beetle* is usually present when the corn plants first come through the ground. If Stewart's wilt, which is carried by this flea beetle, is troublesome, three or four applications of DDT beginning when the corn comes through the ground may be necessary. Be sure to get plenty of insecticide on the ground around the plants.

The *corn borer worms* (figure 37) may get into the ears in some areas. If control is necessary, make DDT applications at 5-day intervals beginning when the first pin holes are observed in the leaves.

The *corn earworm moth* begins egg laying on the corn silk soon after it

appears. Dust or spray the corn silks with 3 or 4 applications of DDT beginning when the silks first appear.

The *fall armyworm* in eastern New York is controlled by the treatments for the corn borer and the corn earworm.

For dosages of DDT to be used for the corn insects, refer to dilution table on page 30.

Tomatoes

Culture

Tomatoes are the "oranges" of the garden. They are an excellent source of vitamin C. At least a few plants should be in every garden because they are easily grown and can be used fresh, canned, or as juice.

Tomatoes are tender and must not be set in the garden until danger of frost is past. The seed is usually planted from 6 to 8 weeks before the time for setting in the garden, in rows about 2 inches apart in the window box or 4 to 5 inches apart in the hotbed. When the plants have developed their first true leaves, transplant them or thin them to stand from 2 to 4 inches apart. The less the roots are injured during transplanting, the quicker the plants will recover and the greater will be their yield. Tomato plants are often transplanted, while small, to individual pots or paper bands which make it possible to transfer them to the garden with a minimum of disturbance to the root system. Plants set in flats will be retarded less when set in the garden if they are blocked out; that is, cut the soil with a heavy knife to the bottom of the flats in both directions between the plants. This is done a few days before transplanting.

The selection of the proper variety is important (table 2, page 62).

If tomatoes are to be pruned and trained to stakes, the plants may be set as close as 2 feet by 2 feet or 18 inches by 3 feet, but otherwise there is no advantage in setting them closer than 3 by 4 feet, and an even greater distance should be allowed for the large growing varieties such as Marglobe. On a given area of land the yield is usually about the same whether the plants are set close, pruned and staked, or whether they are spaced farther apart and allowed to grow all over the ground. Pruned and staked plants produce a large early yield, but usually a smaller total yield. Staking may be desirable where there is usually a considerable loss of fruit due to insect injury.

Mulching with straw or leaves and irrigation greatly reduce fruit cracking and dry blossom-end rot.

Diseases

Mosaic is a common virus disease of tomatoes which mottles the leaves, causes streaked or misshapen fruits, and frequently stunts the plant. The

mosaic virus is carried frequently in tobacco and is readily spread to tomatoes by gardeners handling tomatoes after or while smoking. Insects can also carry this and related viruses from infected weeds to tomatoes. Fungicides have no influence on the disease. Control involves care in use of tobacco, frequent early applications of insecticides, and early elimination of young mosaic plants in the garden.

Blossom-end rot produces a sunken, black, leathery rot around the blossom-end of the fruit. This physiological disease is caused by lack of soil moisture and wide fluctuations in the soil-moisture supply. For control, do not cultivate or hoe close to the plants which would cut the roots, use mulch or irrigation where possible, and avoid use of manure and excess nitrogen on tomatoes.

Anthracnose, also known as "ripe fruit rot," is a fungus that causes the development of sunken, water-soaked, circular spots with target rings on the ripening fruits. Control involves regular applications of maneb or ziram fungicides beginning when the first fruits are walnut-size.

Early blight causes brown, target spots, first on the lower leaves, then followed on middle leaves. Leaves yellow and drop, thus exposing fruits to sunburn. Generally early blight does not spot or rot the fruit. This fungus overwinters on old tomato vines and certain weeds. Control involves: (1) rotating the tomato patch; (2) fall plowing or good garden clean-up; and (3) regular applications of maneb, ziram, zineb, captan, or fixed copper fungicides.

Figure 38. Blossom end rot of tomatoes

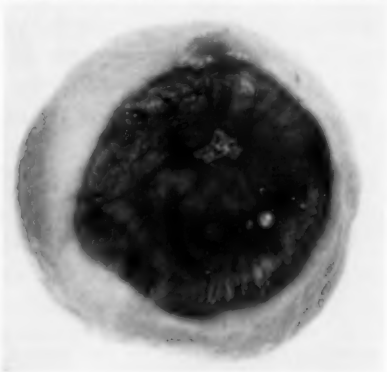


Figure 39. Tomato anthracnose

Late blight is a serious fungus disease that kills the foliage and rots the green and the ripe fruits. This is a corky, firm rot. Affected tops appear to be killed by frost. This disease is caused by the same fungus that causes late blight of potatoes. Blight is serious only in cool wet summers which have many periods of high humidity. In such years, frequent and heavy applications of maneb, fixed copper, or bordeaux mixture should be made. In average years, fungicides milder than bordeaux mixture may be utilized.

Wilt may be caused by two related soil fungi known as *Fusarium* and *Verticillium*. Both are favored by heavy wet soils and high soil temperatures. Fusarium destroys the water and food transport system causing wilt and death of the plant before fruits are ripe. Verticillium causes yellowing, beginning with the older, lower leaves and progressing upward. Angular areas of dead tissue frequently form on leaves in the crown of the plant. A general stunting with reduced fruit size causes a lower yield of poor-quality fruit. Both diseases cause browning in the underground stem and frequently for variable distances upward in the aerial portions. Certain varieties have resistance to either but not both diseases. These are: (1) to Fusarium—Rutgers, Pritchard, Marglobe, Brookston, Kokomo, Tipton, and Boone; (2) to Verticillium—Loren Blood, Moscow, Riverside, and Essar.

Control summary

1. Use only hot-water-treated seed (avoids danger of bacterial canker and bacterial spot).
2. Buy transplants from a reputable careful plant grower.
3. Rotate the tomato area.
4. Do not use tobacco when working with tomatoes, or wash your hands in soapy water before transplanting, staking, tying, or pruning tomatoes.
5. Do not grow seedlings adjacent to dahlias, sweet peas, or petunias.
6. If wilt has appeared in recent years in your garden, use a resistant variety.
7. Spray or dust regularly with maneb, zineb, ziram, captan, or fixed copper. Begin when first fruits are walnut-size, then every 7 to 10 days. Add an insecticide to the early applications. If weather turns cool and wet in July and August, switch to bordeaux mixture, fixed copper, or maneb.

Table 2. Seed and Plant-buying Information

Crop	Varieties Arranged in order of usual preference. Some of these varieties are new and are listed only by a few seedsmen	Amount for one person for one year		Quantity for 100 feet of row	
		Total length of row for all plantings	Yield to be expected from this length of row	Weight needed	Amount to order
		Feet	*Pounds*	*Ounces*	
Asparagus	Mary Washington and other Washington selections *	15	5		75 Plants
Beans, bush lima	Fordhook 242, Henderson, Triumph	25	5	4 to 16	1/2 to 1 lb.
Beans, green snap	Tendergreen *, Tenderlong 15, Topcrop *, Bountiful	50	20	8 to 12	1/2 lb.
Beans, yellow snap	Pencilpod, Sure Crop, Cherokee	25	10	8 to 12	1/2 lb.
Beans, pole	Scotia *, Kentucky Wonder, Blue Lake	25	20	4 to 8	1/4 to 1/2 lb.
Beets	Early Wonder, Detroit Dark Red	30	20	3/4 to 1	1 oz.
Broccoli	Italian Green Sprouting, DeCicco, Waltham 29	15	15	1/40 to 1/30	1 pkt. †
Brussels sprouts	Long Island Improved, Catskill	5	3	1/40 to 1/30	1 pkt. †
Cabbage, early or kraut	Golden Acre, Copenhagen, Glory, or yellows resistant strains of these	10	20	1/40 to 1/30	1 pkt. †
Cabbage, late	Danish, Wisconsin Hollander *, Red Danish	10	20	1/40 to 1/30	1 pkt. †
Carrots	Red Core Chantenay, Nantes, Imperator (for light soil)	50	25	1/20 to 1/15	1 pkt. †
Cauliflower	Super Snowball, Improved Holland Erfurt *, Purple	5	5	1/40 to 1/30	1 pkt. †
Celery, green	Summer Pascal, Emerson Pascal, Utah Strains	15	25 plants	1/100	1 pkt. †
Celery, yellow	Cornell 19 *, Golden Plume *	15	25 plants	1/100	1 pkt. †
Chard	Fordhook, Lucullus, Ruby	5	5	3/4 to 1	1 oz.
Chinese cabbage	Chihli, Wong Bok, Michili	5	10	1/40 to 1/30	1 pkt. †
Corn, extra early	Spancross *, Seneca 60, North Star, Golden Beauty *	20	15 ears	1 to 2	1 to 2 oz.
Corn, early	Marcross *	20	15 ears	1 to 2	1 to 2 oz.
Corn, midseason	Carmel Cross *, Northern Cross *, Golden 50 *	20	15 ears	1 to 2	1 to 2 oz.

Corn, late	Golden Cross, Seneca Chief,* Iochief*	100	80 ears	1 to 2	1 to 2 oz.
Cucumbers	Burpee Hybrid, Marketer, Niagara*, Surecrop Hybrid	10	10	1	1 oz.
Eggplant	Black Beauty, New York Improved	5	3	1/50 to 1/40	1 pkt.†
Endive	Deep Heart, Green Curled	5	5 plants	1/40 to 1/30	1 pkt.†
Kale	Dwarf Green Curled	25	10	1/20 to 1/15	1 pkt.†
Kohlrabi	White Vienna, Purple Vienna	5	3	1/12 to 1/10	1 pkt.†
Lettuce, head	Great Lakes, No. 456 (for hot weather), Pennlake	25	25 heads	1/30 to 1/20	1 pkt.†
Lettuce, leaf	Salad Bowl, Oak Leaf, Grand Rapids	20	10	1/20 to 1/15	1 pkt.†
Muskmelons	Delicious 51*, Iroquois*, Seneca Bender, Harvest Queen*	20	30	1	1 oz.
Onions, from plants	Sweet Spanish	20	20		400 plants
Onions, from sets	Ebenezer, Yellow Globe			16 to 32	1 to 2 lbs.
Parsley	Triple Moss Curled, Paramount	2	1/2	1/20 to 1/15	1 pkt.†
Parsnips	Model, Hollow Crown	15	15	1/6 to 1/4	1 pkt.†
Peas, early	World Record, Little Marvel, Greater Progress	40	20	12 to 16	1 lb.
Peas, midseason	Victory Freezer, Lincoln, Wando	40	20	12 to 16	1 lb.
Peas, late	Stratagem, Alderman	40	20	12 to 16	1 lb.
Peppers, early	Vinedale, Allbig, Burlington*	5	3	1/25 to 1/20	1 pkt.†
Peppers, late	Penn Wonder, California Wonder§, Yolo Wonder*	5	3	1/25 to 1/20	1 pkt.†
Potatoes, early	Chippewa, Cobbler, Cherokee*	50	50	150	10 lbs.
Potatoes, late	Sebago*, Katahdin*, Kennebec*	200	200	150	10 lbs.
Pumpkins	Winter Luxury, New England Pie, Connecticut Field	5	15	1	1 oz.
Radishes	Scarlet Globe, Cherry Belle, Comet, White Icicle	10	10 bunches	1/4 to 1/2	1 pkt.†
Rhubarb	MacDonald, Valentine	6	5		35 plants
Rutabagas	Macomber, Long Island Improved, Laurentian	10	10	1/10 to 1/7	1 pkt.†
Spinach	America*, Long Standing Bloomsdale (for early planting only)	40	20	1/2 to 1	1 oz.
Squash, summer	Yankee Hybrid, Straightneck, Cocozelle, Zucchini	2	4	1/2 to 1	1 oz.
Squash, winter	Delicious*, Buttercup, Hubbard, Table Queen, Butternut	5	15	1/2 to 1	1 oz.
Tomatoes, early	Valiant, Early Hybrid, Fireball, Moreton Hybrid	10	15	1/40 to 1/30	1 pkt.†
Tomatoes, main crop	Stokesdale, Fordhook Hybrid, Longred	30	150	1/40 to 1/30	1 pkt.†
Tomatoes, late	Rutgers*, Big Boy, Sunray (yellow), Red Top (paste)	40	20	1/13 to 1/10	1 pkt.†
Turnip greens	Shogoin, Purple Top White Globe	10	10	1/13 to 1/10	1 pkt.†
Turnips	Purple Top White Globe, Golden Ball	20	30	1	1 oz.
Watermelon	Honeycream, New Hampshire Midget, Rhode Island, Dixie Queen Hybrid				

* Resistant to one or more important diseases. See cultural requirements of individual crops for details. † A packet is usually enough for a family of four or five. The varieties liked best for fresh use are satisfactory for freezing. § Low yielding, but of excellent quality.

Table 3. Vegetable-Planting Information

Crop	Spacing in the row (For spacing between rows see page 14)		Planting dates. These are the usual best times to plant in those areas where the average date of the last frost in the spring is May 5 and the first frost in the fall is October 5. Planting times should be adjusted according to frost dates for other areas. See figure 7, page 10, and figure 8, page 11.						How long before garden planting to sow seed in hotbed, window box, or outdoor seedbed for garden planting
	How thick to sow seeds per foot	Thinned or transplanted	April	May		June		July		
				1–15	16–31	1–15	16–30	1–15	16–31	
	Number	*Inches*								*Weeks*
Asparagus		12 to 18	Plants	Plants						
Beans, bush lima	3 to 4	Do not thin			Seeds	Seeds				
Beans, snap	6 to 8	Do not thin			Seeds	Seeds	Seeds	Seeds		
Beans, pole	2 to 3	Do not thin			Seeds	Seeds				
Beets	10 to 15	2 to 3	Seeds			Seeds		Seeds		
Broccoli		18 to 24	Plants		Seeds		Plants			6 to 8
Brussels sprouts		18 to 24			Seeds		Plants			6 to 8
Cabbage		12 to 18	Plants		Seeds		Plants			6 to 8
Carrots	15 to 20	1 to 3	Seeds				Seeds			
Cauliflower		18 to 24	Plants		Seeds			Plants		6 to 8
Celery		6 to 8					Plants			10 to 12
Chard	8 to 10	4 to 8	Seeds							
Chinese cabbage	4 to 6	12 to 15						Seeds	Seeds	
Corn	1 to 2	9 to 12			Seeds	Seeds	Seeds			
Cucumbers	3 to 4	12 to 15 (hills 48)			Seeds	Seeds				
Eggplant		18 to 24			Plants	Plants				6 to 8
Endive	4 to 6	9 to 12					Seeds	Seeds		
Kale	4 to 6	12 to 24					Seeds	Seeds		
Kohlrabi	6 to 8	2 to 4	Seeds			Seeds		Seeds		
Lettuce, head	4 to 8	12 to 15	Seeds or plants	Seeds	Seeds	Seeds			Plants	6 to 8

Lettuce, leaf	10 to 15	3 to 6	Seeds	Seeds	Seeds	Seeds	Seeds	Seeds	.....	.....
Muskmelons	3 to 4	12 to 15 (hills 48)	.....	.....	Seeds or plants	.....	.....	.....	.....	4 to 5
Onions	10 to 15	2 to 4	Plants or sets	.....	.....	.....	.....	.....	.....	10 to 12
Parsley	10 to 15	4 to 6	Seeds	Seeds	Seeds	.....	.....	.....	.....	.....
Parsnips	15 to 20	3 to 4	Seeds	Seeds	Seeds	.....	.....	.....	.....	.....
Peas	10 to 15	Do not thin	Seeds	.....	.....	.....	.....	.....	.....	.....
Peppers	.....	18 to 20	.....	.....	Plants	Plants	.....	.....	.....	8 to 10
Potatoes	1	10 to 12	Seed pieces	Seed pieces	Seed pieces	.....	.....	.....	.....	.....
Pumpkins	1 to 2	24 to 36 (hills 72)	.....	.....	Seeds	Seeds	.....	.....	.....	.....
Radishes	10 to 15	1 to 2	Seeds	Seeds	Seeds	Seeds	Seeds	Seeds	Seeds	.....
Rhubarb	.....	24 to 36	Plants	.....	Plants	.....	.....	.....	.....	.....
Rutabagas	4 to 6	6 to 10	.....	.....	.....	.....	Seeds	.....	.....	.....
Soybeans	10 to 12	2 to 4	.....	.....	Seeds	.....	.....	.....	.....	.....
Spinach	15 to 20	2 to 4	Seeds	.....	.....	.....	.....	.....	Seeds	.....
Squash, summer	2 to 3	18 to 24 (hills 60)	.....	.....	Seeds	Seeds	.....	.....	.....	.....
Squash, winter	1 to 2	24 to 36 (hills 72)	.....	.....	Seeds	Seeds	.....	.....	.....	.....
Tomatoes	.....	24 to 28	.....	.....	Plants	Plants	.....	.....	.....	6 to 8
Turnip greens	15 to 20	1 to 3	Seeds	Seeds	Seeds	Seeds	Seeds	Seeds	Seeds	.....
Turnips	6 to 8	4 to 6	.....	.....	.....	.....	.....	Seeds	Seeds	.....
Watermelons	2 to 3	18 to 24	.....	.....	Seeds or plants	.....	.....	.....	.....	4 to 5

Insects

Cutworms often attack young tomato plants. Their control is discussed on page 31.

Flea beetles are troublesome to tomatoes in most areas. Treat the plants with DDT in the flats before you set them out. It may be desirable to make an additional application in the garden 10 days after setting the plants. Be sure to get plenty of spray on the soil around the plants.

Colorado potato beetles sometimes appear on tomatoes. Hand picking may take care of them; DDT will, however, control them.

Aphids can be controlled with malathion.

Tomato hornworm (figure 40) is a large, green, white, barred caterpillar with a horn sticking on the tail end. Hand pick these worms.

Figure 40. Tomato hornworm

For tomato fruitworm a dust or spray of DDT may be necessary. Do not apply DDT closer than 14 days to picking. Always wash tomatoes thoroughly before using them.

For dosages of the various insecticides recommended, refer to the dilution table on page 30.

Turnips

Culture

Turnips are a cool-season, quick-maturing crop, and usually do best when planted in late July or early August in upstate New York. The plants are hardy and may be left in the ground until severe freezing weather comes in the fall. Sometimes turnips fail to germinate or the seedlings are killed by black rot. If this trouble has occurred previously, use only hot-water-treated seed.

Watermelons

Culture

Watermelons may now be grown satisfactorily in most parts of the State because of the introduction of new early varieties. The culture of watermelons is similar to that of muskmelons.

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